THERMAL PRINTER

TUP400 Series

TECHNICAL MANUAL

[SECOND EDITION]

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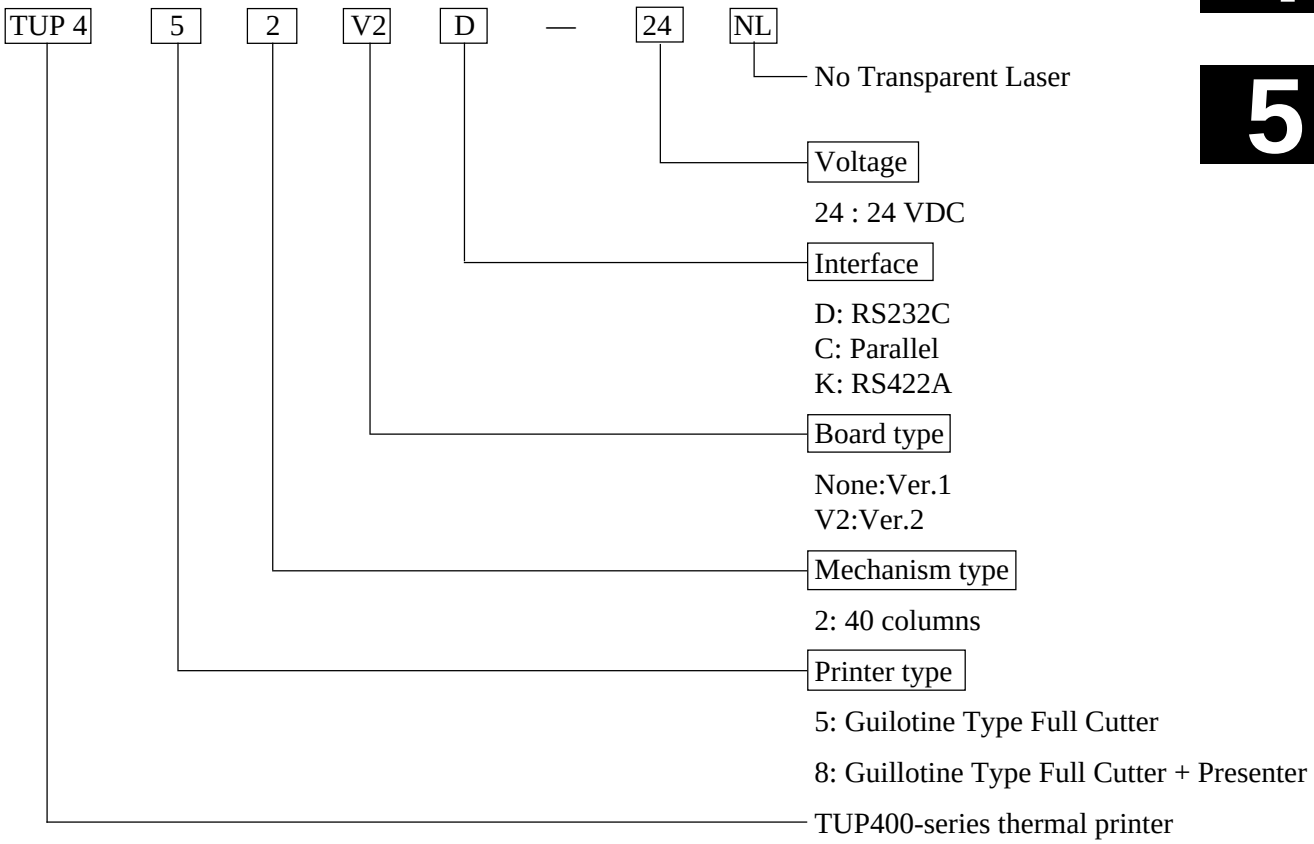
INTRODUCTION

This manual was created as a reference for maintenance of the Thermal Printer TUP400 Series for personnel who are responsible for periodic inspections or troubleshooting of that equipment. This manual was written for maintenance personnel, and was not intended to be used by the general operator.

This manual is organized into the following chapters.

Chapter 1 Specifications and Operation
Chapter 2 Theory of Operation
Chapter 3 Parts Replacement and Related Adjustments
Chapter 4 Maintenance and Lubrication
Chapter 5 Parts Lists

Model Name



• First edition : Aug. 1997
• Second edition : Jun. 1998 Add interface board Ver. 2

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CHAPTER 1
SPECIFICATIONS AND OPERATION

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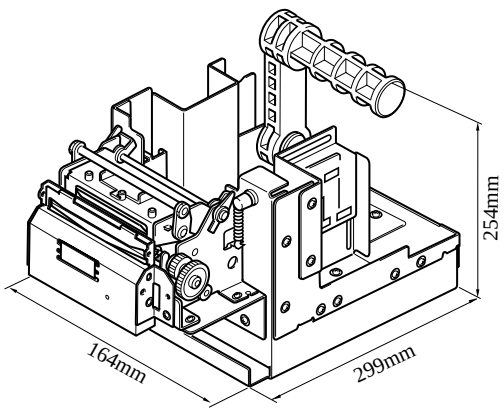
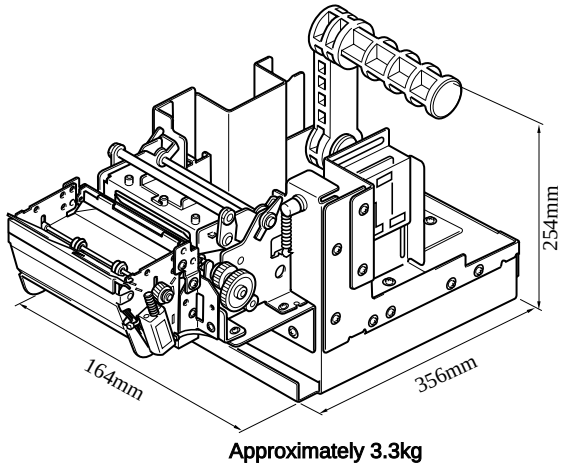
1. General Specifications

Printing method	Line thermal direct	
Resolution	8 dots/mm (H) × 8 dots/mm (V)	
Printable width	50 mm in Line Mode; 80 mm in Page Mode	
Printing speeds	2 Inches/sec and 1 Inch/sec	
Printable characters	Page mode: ANK, International, Slash zero	
	Line mode: ANK, International, Special, Block graphics, IBM special,	
	IBM block graphics, Chinese characters, Slash zero	
	NOTE: ANK is comprised of ASCII characters and Japanese katakana characters.	
Character matrixes	Page mode	
	Small	8×16
	Standard	16×24
	Wide	24×32
	OCR-B	16×24
	Chinese chara.	24×24
	Line mode	
	IBM block graphic	12×24 or 12×32
	Chinese chara.	24×24 (12×24)
	All others	12×24
Bar Codes	JAN, EAN, UPC, Code39, ITF, Code93, Code128, NW-7	
Paper		
Recommended brands	TF50KS-E, TF62KS-E (Nippon Paper Industries)	
	KP50-HEAEX (New Oji Paper Co., Ltd.)	
Width	82.5^{0}_{-1} mm(3.25 inches)	
Thickness	General thermal paper 60 to 85 μm	
Roll diameters	External 203 mm max. (8 Inch), Internal 32 mm (1.26 Inch)	
Interface	RS232C, RS422A, or Parallel	
MCBF	5,000,000 Lines	
Head longevity	100 Km or 1.0 x 10^8 pulses(excludes damaged caused by dirt or foreign objects.)	
	(Missing dots is Max. 5%. However, there will be no missing dots up to 50Km.	
	This is the point where the thermal body resistor value varies more than 15% of the	
	initial value when continuously printing up to 12.5% of the printing rate.)	
Cutter longevity	300,000 cuts (One piece max. paper thickness: 85 μm.)	
Power supply	DC 24 V ±7%	
Power consumption	Max. 120 W	
Operating environment	Temperature 5°C to 40°C	
	Humidity 25% to 80% (No condensation)	
Storage environment	Temperature -20°C to 60°C	
	Humidity 10% to 90% (No condensation)	



Approximately 3.1kg
TUP452



Approximately 3.3kg
TUP482

Fig. 1-1 External Dimensions

2. External Appearance

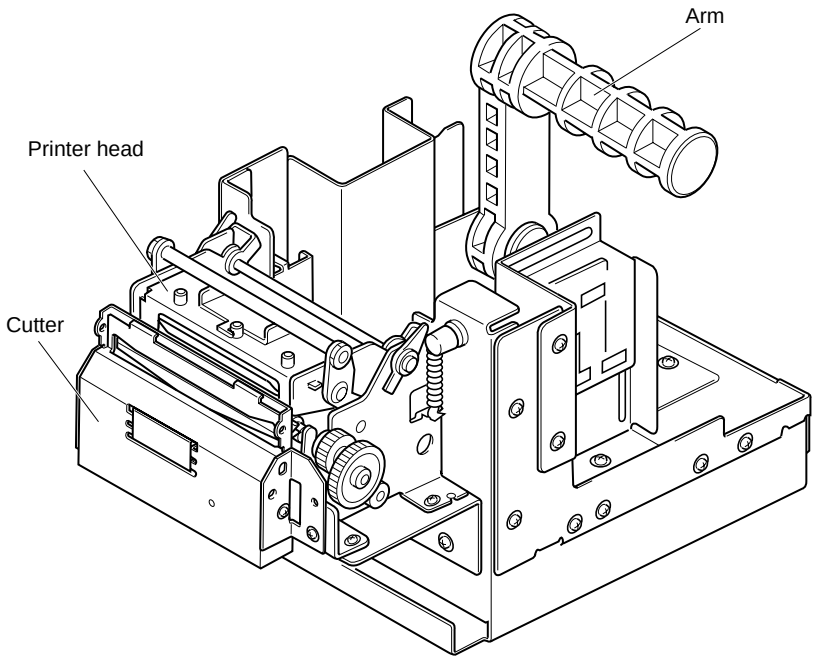


Fig. 1-2-a Internal Configuration (TUP452)

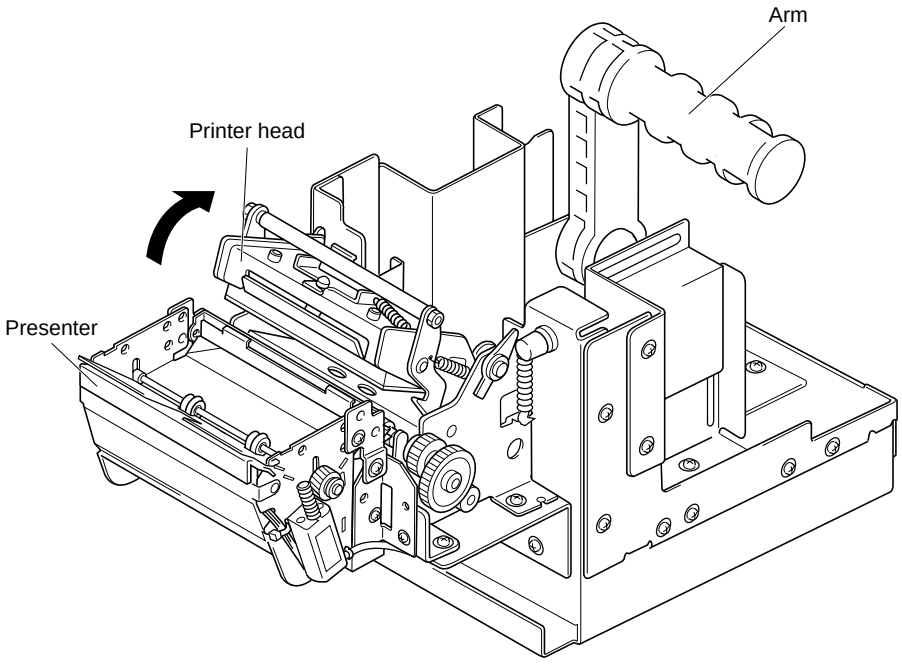


Fig. 1-2-b Internal Configuration (TUP482)

3. DIP-Switch Settings

DIP switches are located on the interface board and they differ according to the type of interface.

(1) Setting the DIP Switches

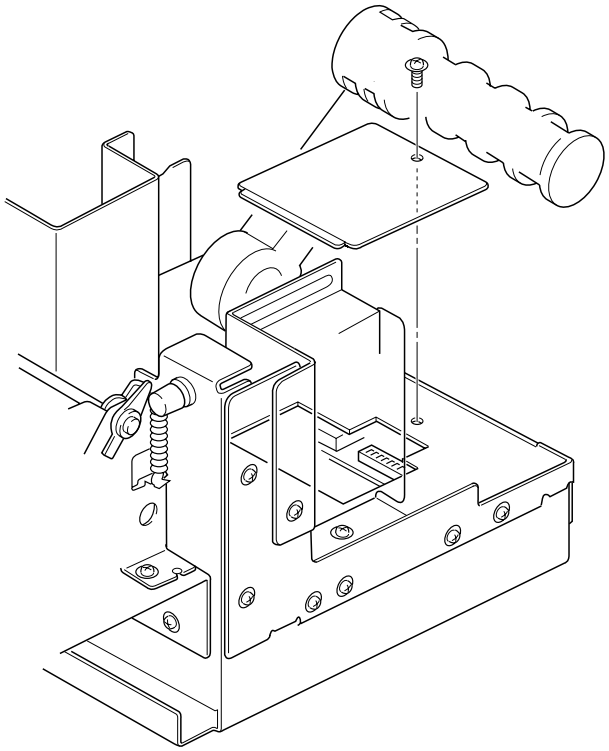


Fig. 1-3 DIP-Switch Settings

1. Turn the power supply OFF.
2. Remove the screw holding the ROM cover in place. (The screw is located at the base of the paper-roll holder.)
3. Remove the ROM cover to expose the main and interface PCBs

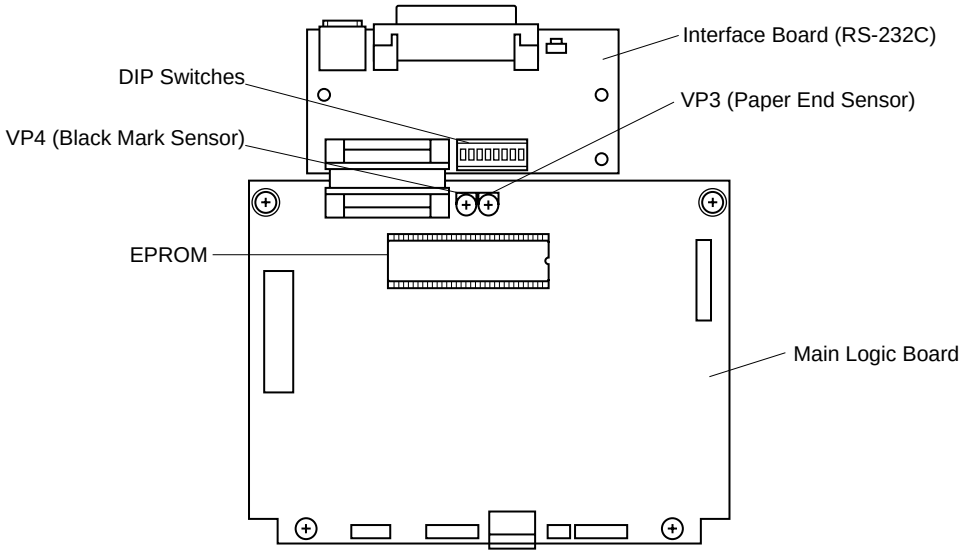


Fig. 1-4 Main Interface Board

4. Set the DIP-switches on the interface board.

2. DIP-switch values

(1) RS-232C interface
This board has a single 8-bit DIP switch.

Switch	Setting	ON	OFF
1-1	Baud		
1-2			
1-3	Handshake	DTR	XON/XOFF
1-4	Data	8 bits	7 bits
1-5	Parity	No parity	Enabled
1-6	Parity	Odd	Even
1-7	DC1/DC3	Disabled	Enabled
1-8	Power ON		

Baud	1-1	1-2
2400BPS	OFF	OFF
4800BPS	OFF	ON
9600BPS	ON	ON
19200BPS	ON	OFF

Mode	1-8 ON	Power On
DC1/DC3 Disabled	Disabled	Printer selected
DC1/DC3 Disabled	ON	Printer selected
	OFF	Printer de-selected
Addressable	ON	Printer de-selected
	OFF	Printer selected

*1 The old type is selected.

(2) RS-422A interface
This board had two DIP switches: one 8-bit switch and one 4-bit switch.

DIP switch #1 (8 bits):
Identical to the DIP switch on the RS-232C. (Bit 1-7 is disabled.)

DIP switch #2 (4 bits):

		SW2-1	**SW2-2**	**SW3-3**	**SW2-4**
DC1,3 off		ON	ON	ON	ON
Address	#1	OFF	ON	ON	ON
	#2	ON	OFF	ON	ON
	#3	OFF	OFF	ON	ON
	#4	ON	ON	OFF	ON
	#5	OFF	ON	OFF	ON
	#6	ON	OFF	OFF	ON
	#7	OFF	OFF	OFF	ON
	#8	ON	ON	ON	OFF
	#9	OFF	ON	ON	OFF
	#10	ON	OFF	ON	OFF
	#11	OFF	OFF	ON	OFF
	#12	ON	ON	OFF	OFF
	#13	OFF	ON	OFF	OFF
	#14	ON	OFF	OFF	OFF
DC1,3 mode on		OFF	OFF	OFF	OFF

* DIP-SW #2 overrides the DIP-SW #1 DC1/3 setting (bit 1-7).
* DIP-SW #2 factory setting: All ON

(3) Parallel (Centronics) interface
The parallel-interface board has no DIP switches.

4. Print-Density Adjustment

Adjust the print density in accordance with the sensitivity of the paper being used.

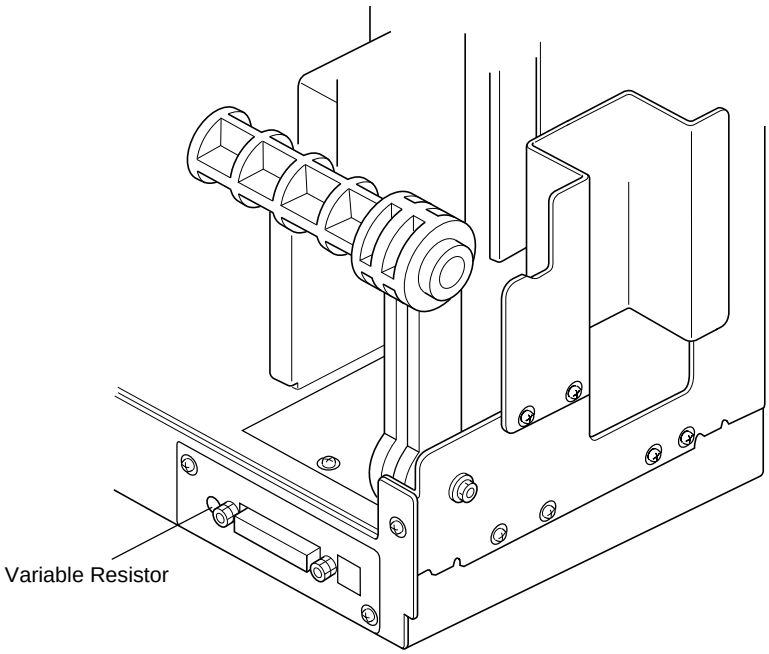
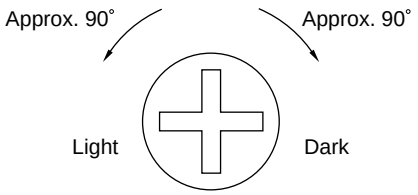


Fig. 1-5 Print-Density Adjustment

1. The variable resistor is located to the left of the interface connector on the back side of the printer.

2. Use a phillips screw driver to rotate the variable resistor to adjust the print density. The variable resistor will rotate approximately 180°.



If you are not getting a good print on the thermal paper with the density set to its maximum at 2 Inch/sec print speed, set the print speed to 1 Inch sec.

CAUTION

Avoid setting density too high for sensitive paper types. Excessive dark values may cause the paper to swell which will degrade the quality of the image.

5. Sensor Adjustment

You must adjust the paper sensor for the paper quality and the black mark print.

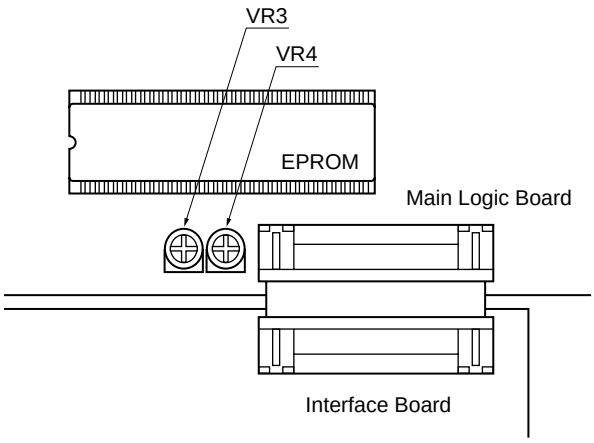


Fig. 1-6 Sensor Adjustment

1) Remove the screw on the underside of the paper-roll holder and remove the ROM cover.

2) Turn ON the power supply while holding down the push switch on the Near-end Sensor Board.
Remove the push-switch within 3 seconds after the "HU" LED on the Near-end Sensor Board lights.

CAUTION

If you continue holding the push switch for more than 3 seconds, the "PE" LED will light and you will not be able to make any adjustments.

3) Black Mark Sensor
- Insert a piece of paper into the mechanism's sensor area. Set it anywhere but the book mark area.
- Rotate the variable resistor VR4 on the main logic board until the "HU" LED on the Near-end Board lights.

Paper End Sensor
- Insert a piece of paper into the mechanism's sensor area. Set it anywhere but the book mark area.
- Rotate the variable resistor VR3 on the main logic board until the "PE" LED on the Near-end Board lights.

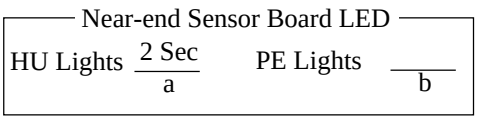
4) After the LED lights, press the RESUME switch.

6. HEX Dump Mode/Test Print

You can enter the HEX Dump Mode and run Test Prints by turning ON the power supply while pressing the RESUME switch. The HEX Dump mode prints the data sent from the host computer in HEX data format.

1) Turn ON the power supply while pressing the RESUME switch.

2) Release the RESUME switch using the following timing to set each mode.



Releasing at a: HEX Dump Mode

Releasing at b: Test Print

7. Changing the Interface Board

You can change the printer's interface by replacing the interface board.

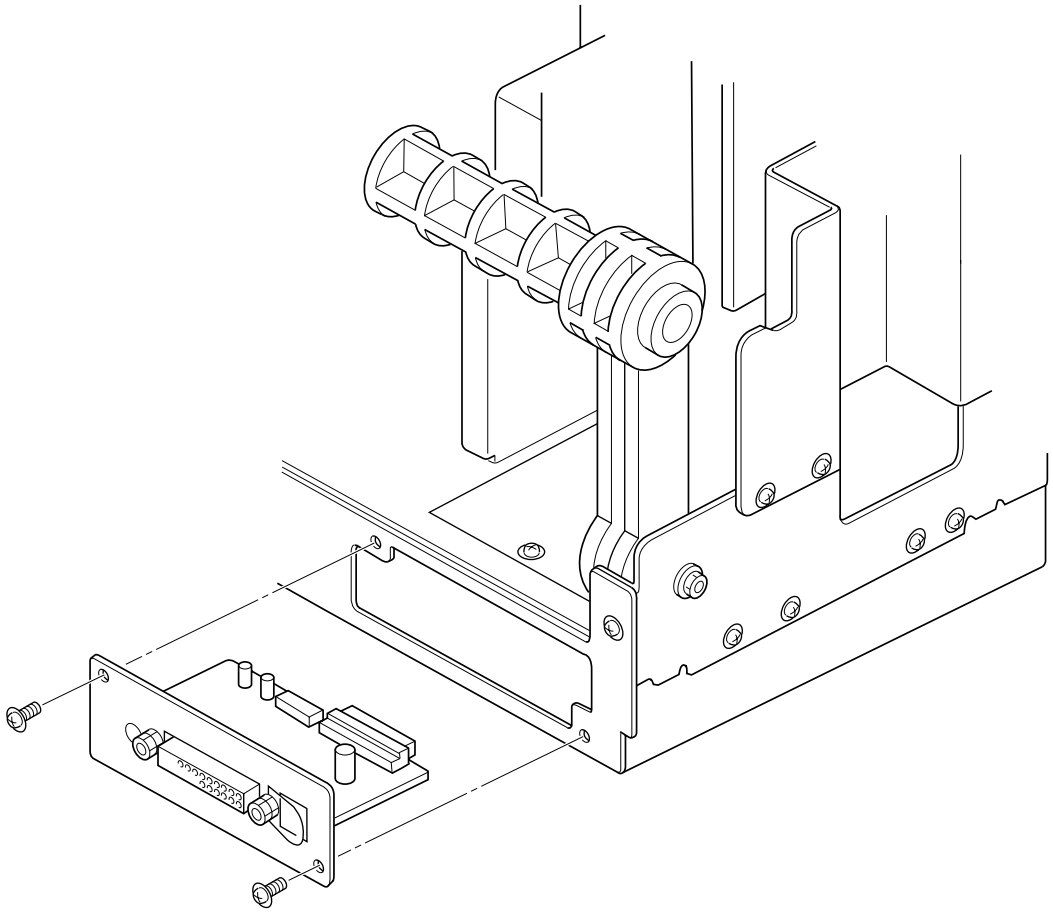


Fig. 1-7 Changing the Interface Board

1. Turn the power supply OFF.
2. Remove the 2 Interface Board Screws.
3. Remove the Interface Board.
4. Insert the new Interface Board by pushing it along the guides.
   Push until the connector is completely inserted.
5. Attach the 2 screws to attach the Interface Board to the printer.

(Note)
The printer will automatically recognize the new Interface Board when it has been changed.

CHAPTER 2
THEORY OF OPERATION

This chapter describes the operating principles of the circuitry and printer mechanism.

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1. Block Diagram

The following is the block diagram for this printer.

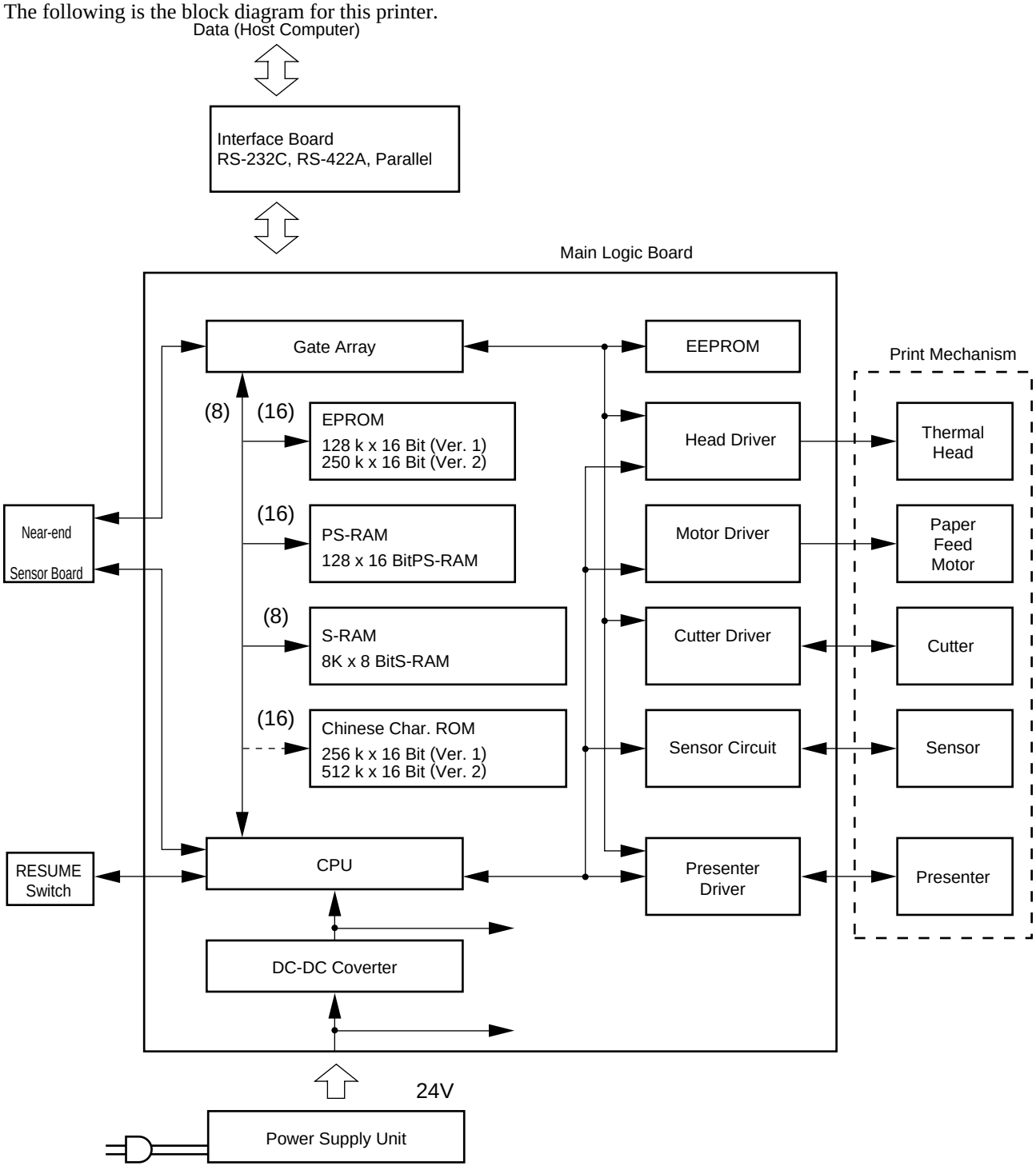

Fig. 2-1 Block Diagram

(1) Main Logic Board

The interface board relays data from the host computer to the main logic board. The main logic board's CPU temporarily stores the data into local RAM.
It then reads out the data, edits it according to the control program stored in the board's ROM, and prints the results by issuing the appropriate drive signals to the printer mechanism.

[Block Description]

a. CPU: HD641300F, CMOS single-chip computer
   Controls overall printer operation.
b. EPROM
   Contains the program and character fonts (other than Chinese characters) for CPU control.
c. PS-RAM: 128 K × 16 bits
   Used as the work area and data buffer
d. S-RAM 8 K × 8 bits
   Saves format data and externally defined characters.
e. EEPROM: 1024 bits
   Stores printer settings. Settings can be changed by software. (Used in place of dip-switches.)
f. Gate array
   Executes various types of signal processing.
g. Drivers
   The various drivers convert signals received from the CPU and gate array into the drive signals that directly control the printer mechanism.
h. DC-DC converter
   Converts 24V to 5V.

(2) Interface board

Interfaces the main board with the host computer.
There are three versions, each for a different interface type: RS-232C, RS-422A, or Centronics parallel.

(3) Near-end sensor board

a. Checks the amount of paper remaining on the paper roll.
b. Used to adjust the sensor.
c. Displays errors using the LED.

(4) RESUME Switch

a. Used to set paper.
b. Used in HEX Dump output and test prints.

(5) Printer Mechanism

The printer mechanism is composed of the thermal head, paper feed motor, cutter sensors and presenter (only on the TUP482.)

2. Main Logic Board

2-1. Data I/O Circuitry

The main logic board relays data back and forth to the host computer via the interface board.

2-1-1. RS-232C Interface

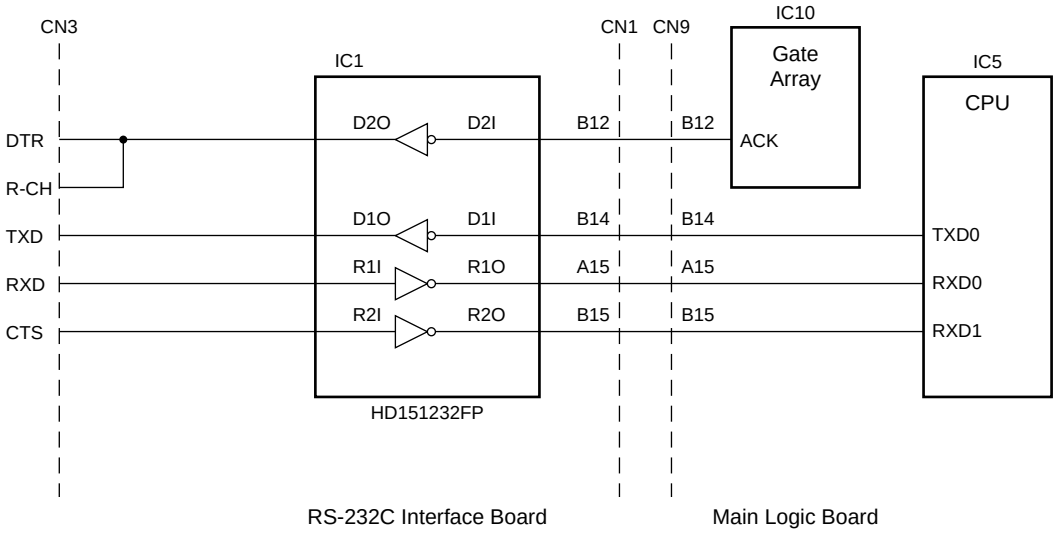

Fig. 2-2 RS-232C Interface

Data from host to printer passes through the IC1 on the interface board from the RXD terminal and is input to the CPU on the main logic board.
IC1 converts the RS-232C and TTL voltage levels.
The CPU converts the input serial data to parallel data and stores that data in the memory buffer memory. It also converts the internal parallel data to serial data and outputs that to the IC1.
The CTS line is hardware-connected, but the connection is not recognized by software. (The printer does not monitor the signal.)

2-1-2. RS-422A Interface

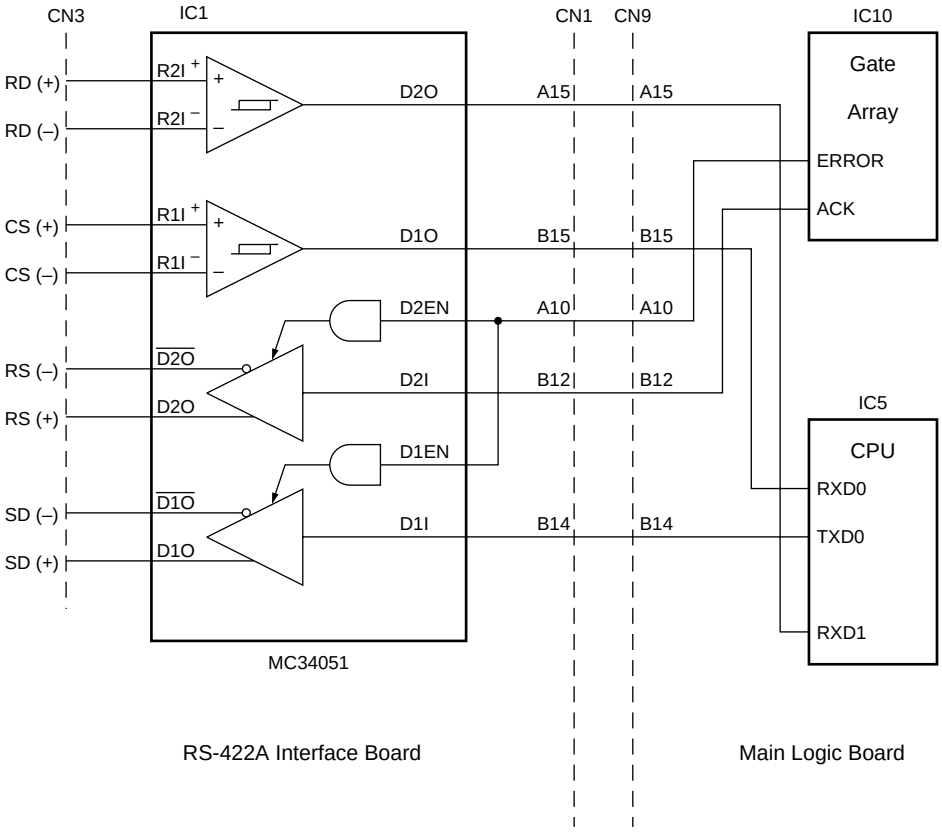

Fig. 2-3 RS-422A Interface

Data flow from host to printer passes from the RD terminal to the IC1 on the interface board and is input to the CPU. The IC1 converts the RS-422A and TTL voltage levels.
The CPU converts the input serial data to parallel data and stores that data in the memory buffer memory. It also converts the internal parallel data to serial data and outputs that to the IC1.

2-1-3. Parallel Interface

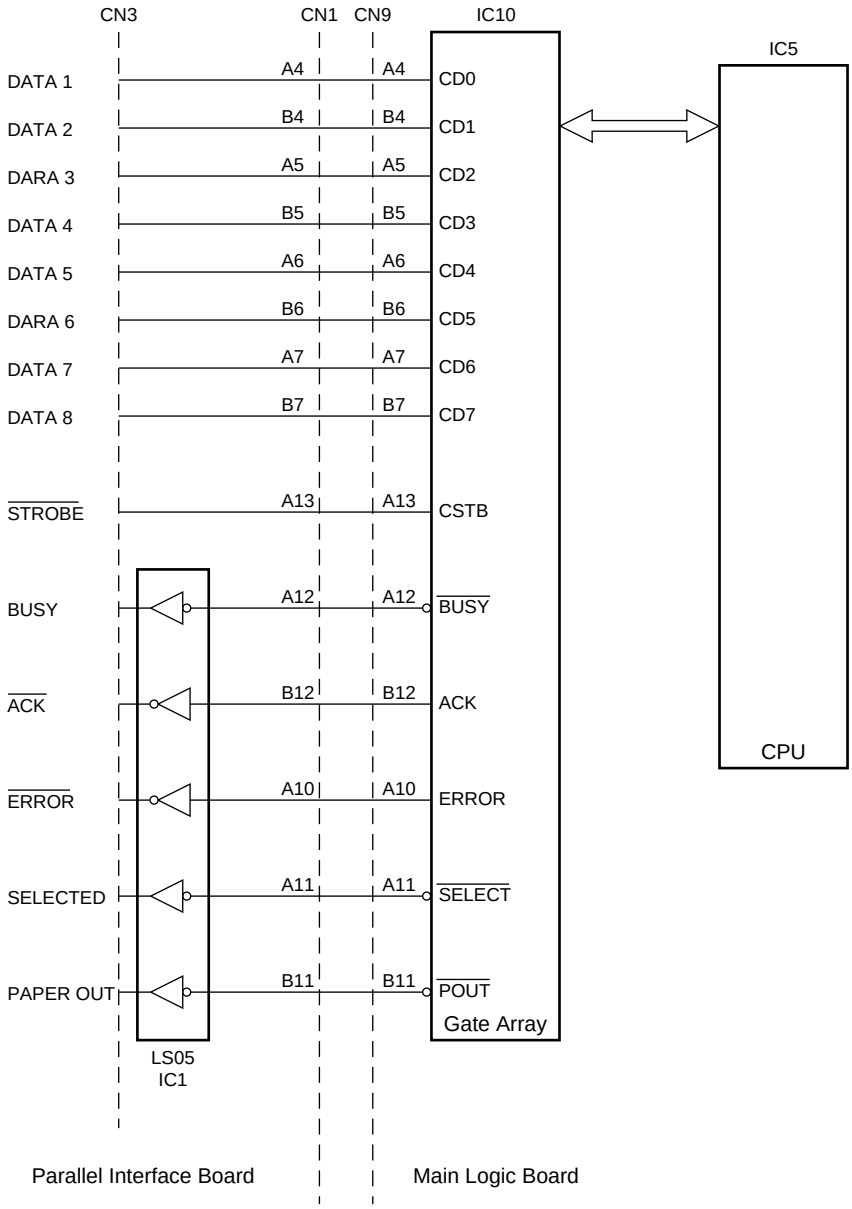

Fig. 2-4 Parallel Interface

The host computer sends eight bits of data for DATA 1 - 8 to the CN3 connector when the BUSY signal is LOW (printer is ready).
The data passes through the interface board and gate array, then moves into the CPU.

Printer signals from the CPU ($\overline{\text{ACK}}$, $\overline{\text{ERROR}}$, SELECTED, PAPER OUT, etc.) pass through the gate array and are output the appropriate connector pins.

2-2. Editing and Printing

2-2-1. Editing

The CPU reads data sequentially from RAM and edits it in accordance with program instructions stored in EPROM. The edited data undergoes parallel-to-serial conversion in the gate array, and is then output to the thermal head's drive controller.

2-2-2. Thermal Head

The thermal head contains 640 heat elements. Printing is carried out by switching these elements ON or OFF as required. (Note that Line Mode supports 600-dot printing only. Heat elements numbered 1 to 20 and 621 to 640 are always off. (Off data is always being transmitted.)) The thermal head has a built-in dedicated drive controller. The controller consists of a shift register, a latch circuit, and a driver circuit, as illustrated below.

The drive controller receives serial data (SI) from the drive control board in sync with the CLOCK signal. The controller latches the incoming data ($\overline{\text{LATCH}}$), then outputs it to the heat elements in sync with the trailing edge of the $\overline{\text{STROBE}}$ signals. A data value of LOW corresponds to a heat-element value of ON.

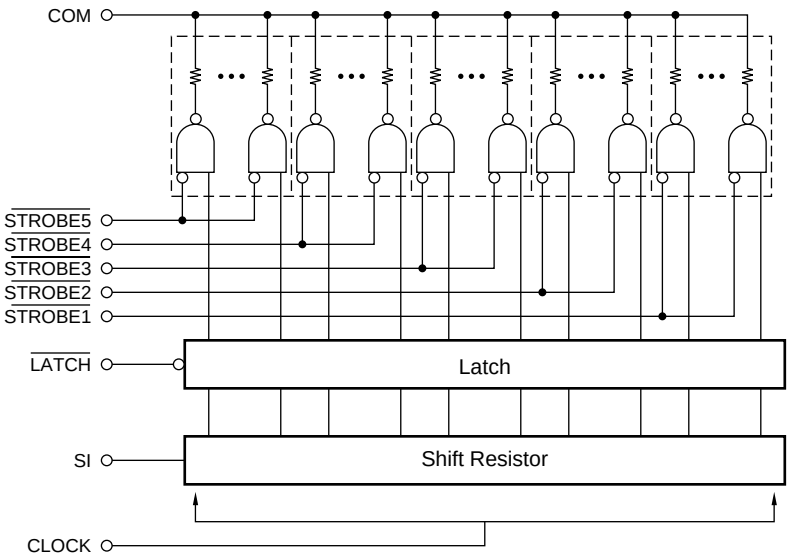

Fig. 2-5 Thermal-Head Drive Circuit

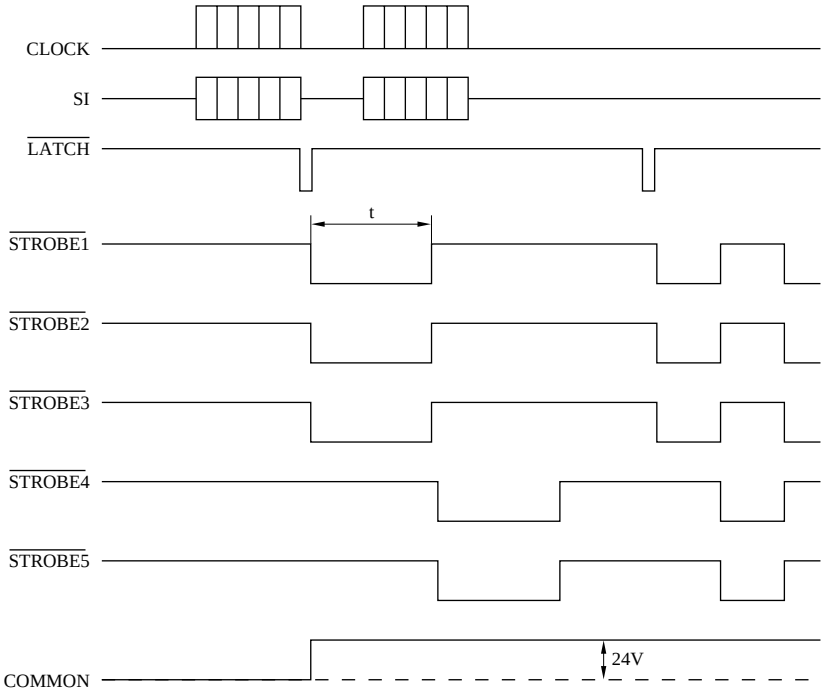

Fig.2-6 Timing Chart

2-2-3. Head Current Control

Heat buildup in the head during operation can cause print quality to degrade. To maintain uniform printing quality, the printer varies the energizing time (time that STROBE remains LOW) in accordance with the head temperature.
The thermal head's surface temperature is calculated based on the resistance value of an attached thermistor. Energizing time is reduced at higher temperatures, as indicated in the Figure 2-6.

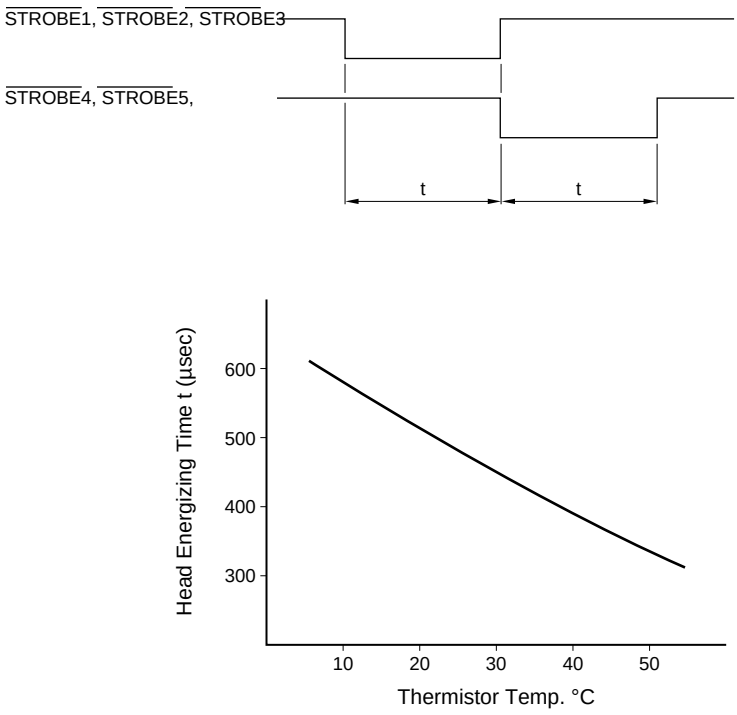

Fig. 2-7 Head Energizing Control

2-3. Feed-Motor Drive Circuit

This printer employs a paper feed motor and a stepping motor. The motor rotates through a certain angle each time it receives a pulse from the drive circuit. This printer employs a 4-phase stepping motor and controls the paper feed motor with a phase 1-2 excitation method. The following diagram illustrates the phase 1-2 excitation method. Diagram 2-8 shows the feed-motor drive circuit.

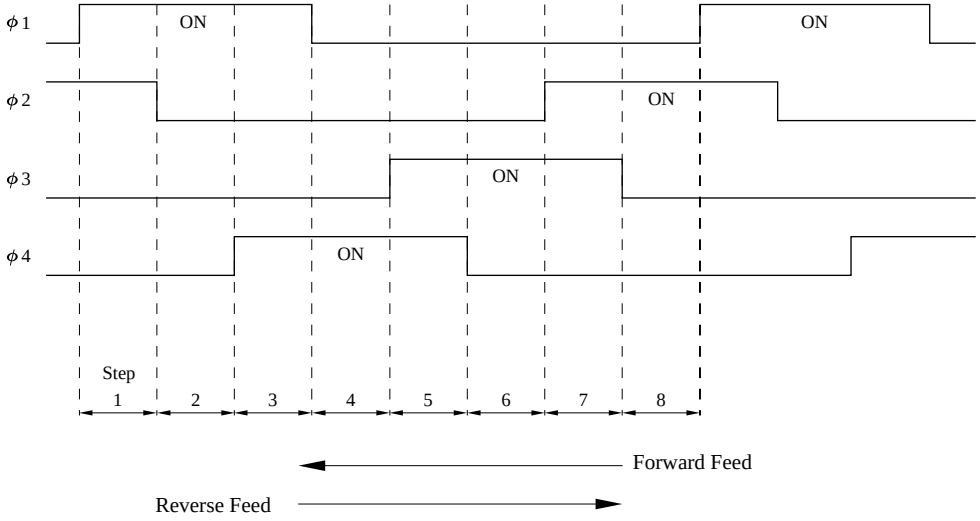

Fig. 2-8 Motor Control by Phase 1-2 Excitation

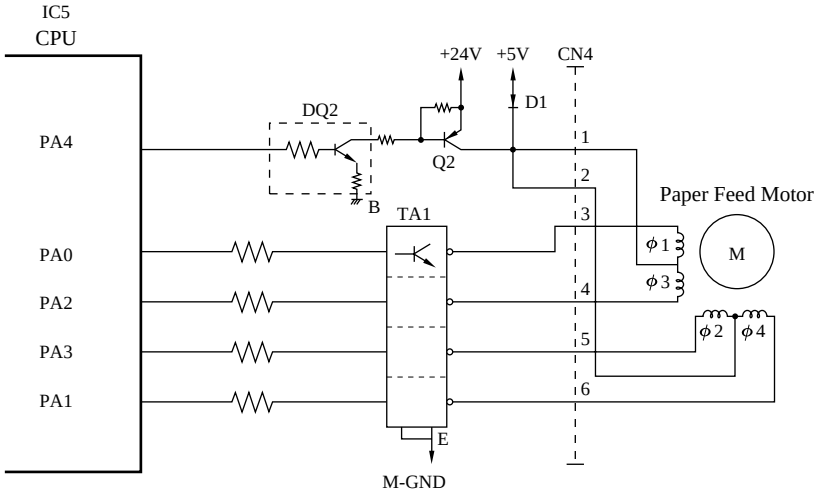

Fig. 2-9 Feed-Motor Drive Circuit

Voltage to the motor is controlled to produced the required action, as follows.

Mode	Voltage	Action
Operating	VM (+24V) VL (+5V)	Drives the motor
Idle	VL (+5V)	Holds the motor

Voltage is controlled by PA4 pin of the CPU, which goes HIGH or LOW to switch transistors DQ2 and Q2 ON and OFF. When Q2 is ON, the paper feed motor receives VM (+24V). When Q2 is OFF, VL (+5V) is supplied to the motor via diode D1.

2-4. Power-On Reset Circuit

Immediately following power-on the printer executes a power-on reset, initializing all circuit elements. The power-on reset serves as protection against operational errors. The power-on RESET signal is maintained for approximately 160ms. The reset circuit is illustrated below.

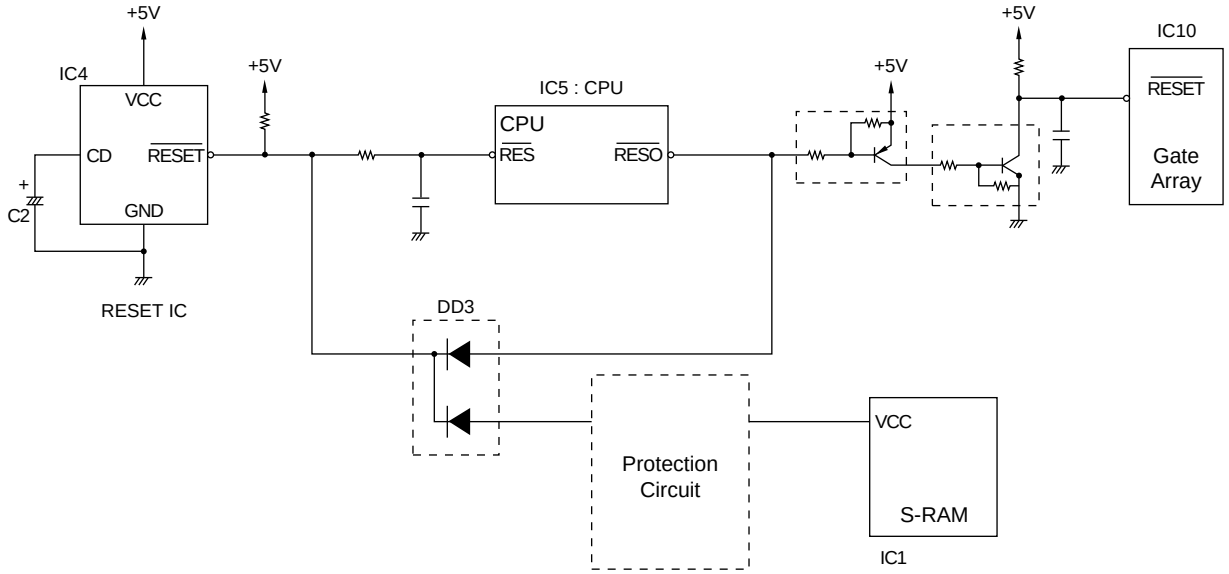

Fig. 2-10 Power-On Reset Circuit

(1) At power on, voltage-detector circuit IC4 (M51953BL) outputs a LOW signal from its OUT terminal. The following formula is used by capacitor C2 (0.47μF).

$T = 0.34 \times C2\ (pF)\ [\mu s] = 160ms$

(2) The LOW signal resets the CPU and the mechanism drive circuits.

(3) The LOW signal sets S-RAM into backup status.

2-5. +5V Line Voltage Detector Circuit

The voltage-detection IC detects momentary drops or unstable levels in the +5V line voltage.
The following illustrates the equivalence circuit of the voltage detector IC (Fig. 2-9 IC4).

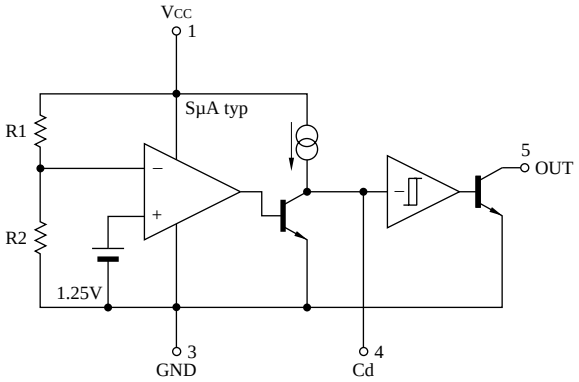

Fig. 2-11 Equivalence Circuit for Voltage Detecting IC

The following operation timing chart shows control is performed by the voltage detector IC output. If the +5V line voltage falls below 4.25V, the IC produces a reset signal from its OUT terminal, resetting the CPU and the gate array.

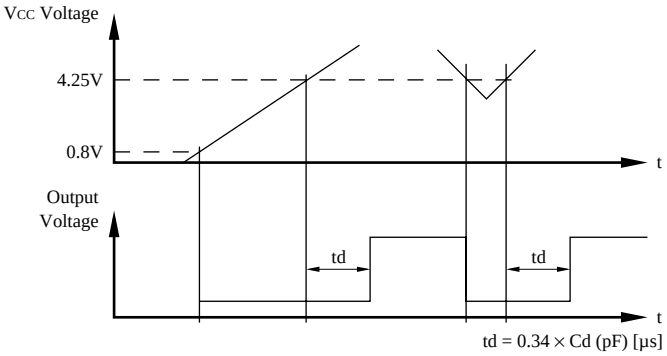

Fig. 2-12 Operation Timing Chart

3. Printer Mechanism

3-1. Thermal Head

TSP400 series printers employ thermal line printing. The thermal head consists of a horizontal line of 640 heat elements. These elements print one line of dots at a time as the paper passes over the head. The head is fixed in position; only the paper moves.

The printer prints a dot by heating the corresponding heat element. The heated element causes a chemical reaction in the coloring layer of the thermal paper, resulting in the formation of a visible dot.

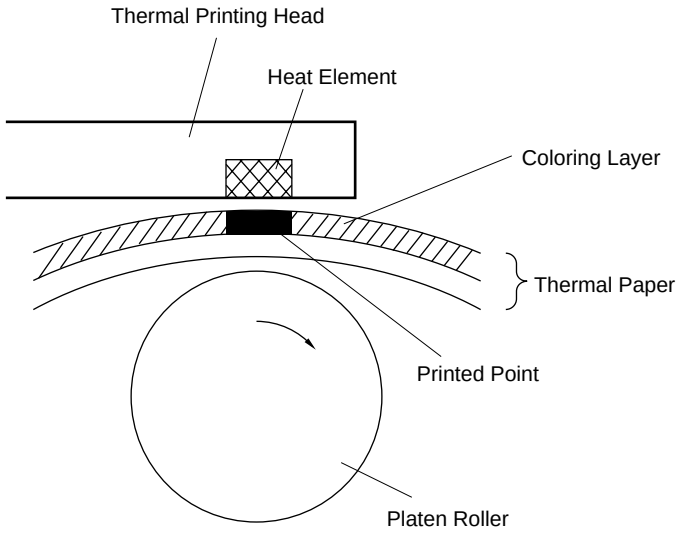

Fig. 2-13 Principle of Thermal Printing

3-2. Paper-Feed Mechanism

The paper-feed mechanism is comprised of the paper-feed motor, gear train, platen, and thermal head. The paper-feed motor drives the gear train, which in turn rotates the platen. The platen carries the thermal paper past the thermal head.

The paper-feed motor is a PM (permanent magnet) type, 4-phase 48-pole stepping motor. A single step feeds the paper approximately 0.125mm.

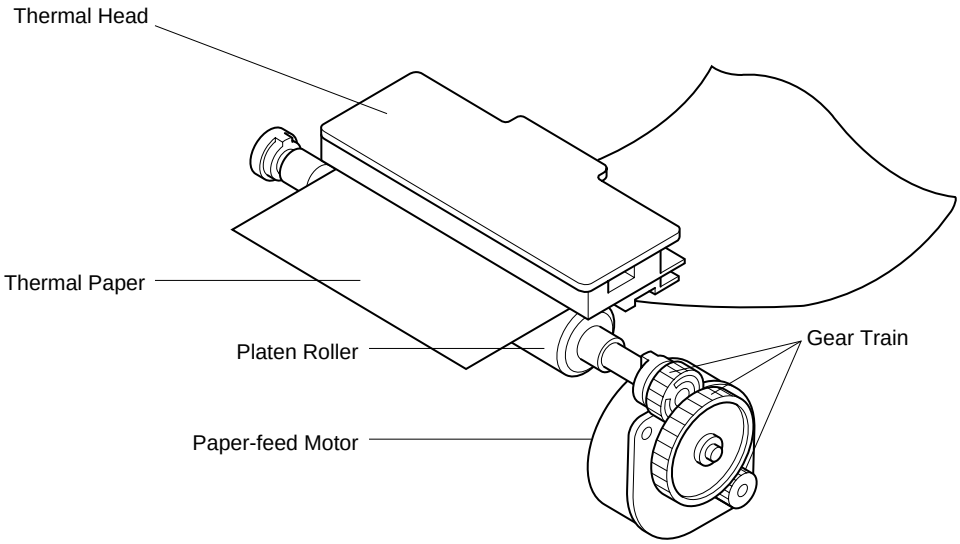

Fig. 2-14 Paper-Feed Mechanism

3-3. Sensor

(1) Paper-Out Sensor

The paper-out sensor is located at the paper entry slit. The detector consists of a reflective photosensor. The photosensor's phototransistor remains ON while paper is present. It goes OFF when paper runs out, generating output of a paper-out signal.

(2) Black-Mark Sensor

This detector senses black marks indicating print start positions. The detector is useful only with specially marked paper. Like the paper-out detector, the black-mark detector consists of a reflective photosensor. The photosensor's phototransistor goes OFF when a black mark appears.

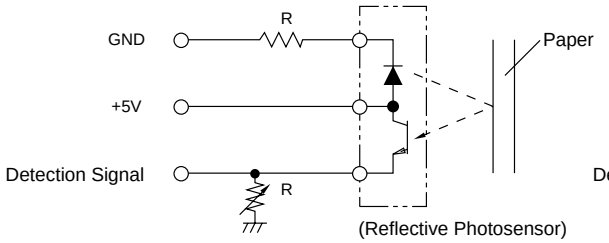

Fig. 2-15 Paper-Out Detector

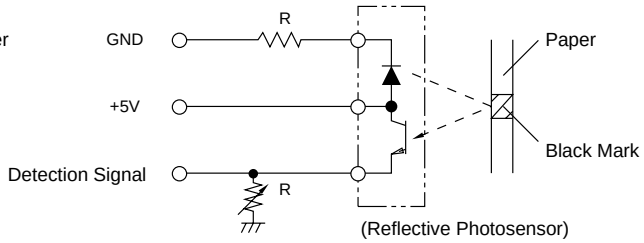

Fig. 2-16 Black-Mark Detector

(3) Paper Near-end Sensor

The Paper Near-end Sensor detects the amount of paper remaining on the roll. When the roll paper no longer exists at the set position, the reflective photosensor turns OFF and outputs a no paper signal.

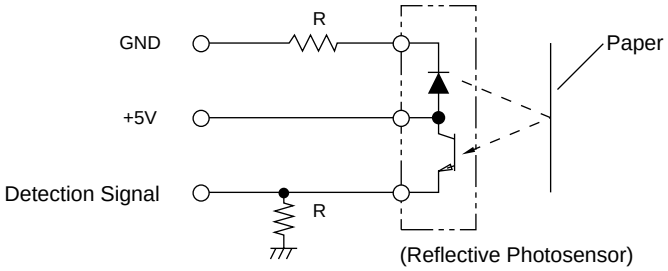

Fig. 2-17 Paper Near-end Sensor

(4) Head-Up Detector

This detector consists of a leaf switch indicating whether the head is closed (in contact with the platen) or open (separated from the platen). The leaf switch is closed when the head is closed; it opens when the head is opened.

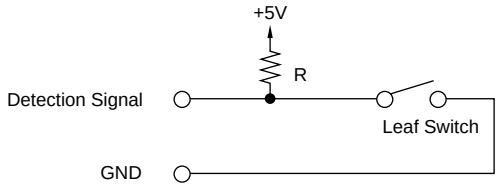

Fig. 2-18 Head-Up Detector

CHAPTER 3
PARTS REPLACEMENT AND RELATED ADJUSTMENTS

This chapter describes disassembly and reassembly procedures.
Please take note of the following.

1. ALWAYS disconnect the power cord from the AC outlet before beginning a disassembly or reassembly procedure.
2. Except where otherwise stated, the reassembly procedure is the reverse of the disassembly procedure.
3. Coat screw heads with locking sealant after completion of reassembly.
4. Refer to Chapter 4 Section 2 for important information about lubrication requirements.

Note : The printer has no adjustable parts.

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2. Cutter 30

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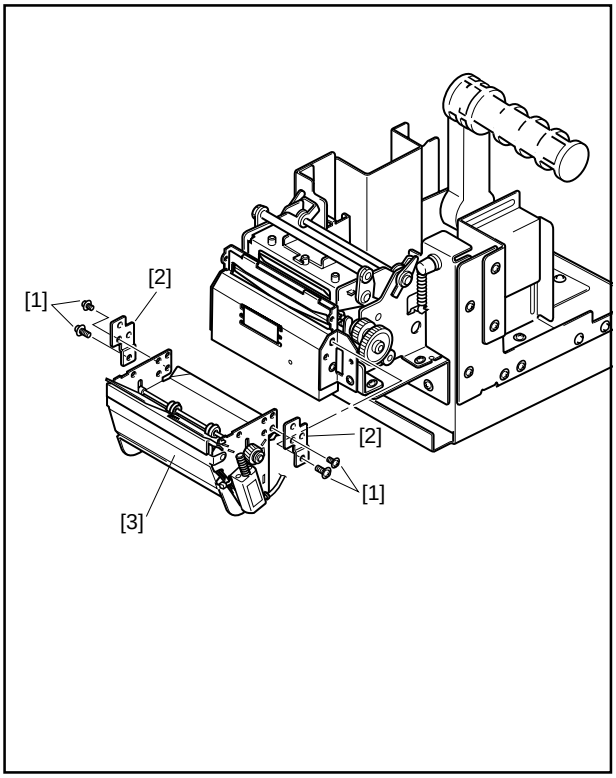
5. Print Head Unit 32

6. Feed Motor Assembly 32

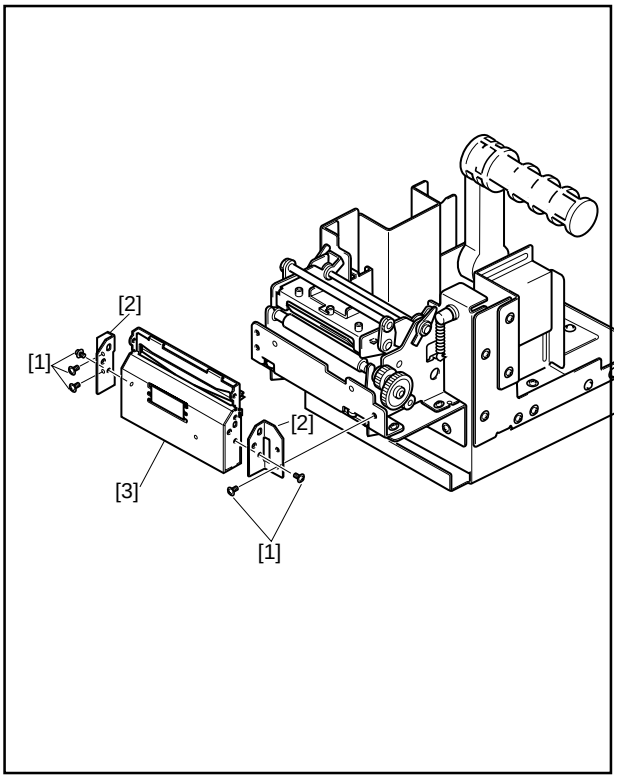
7. Sensor Unit 33

1. Presenter (TUP482)



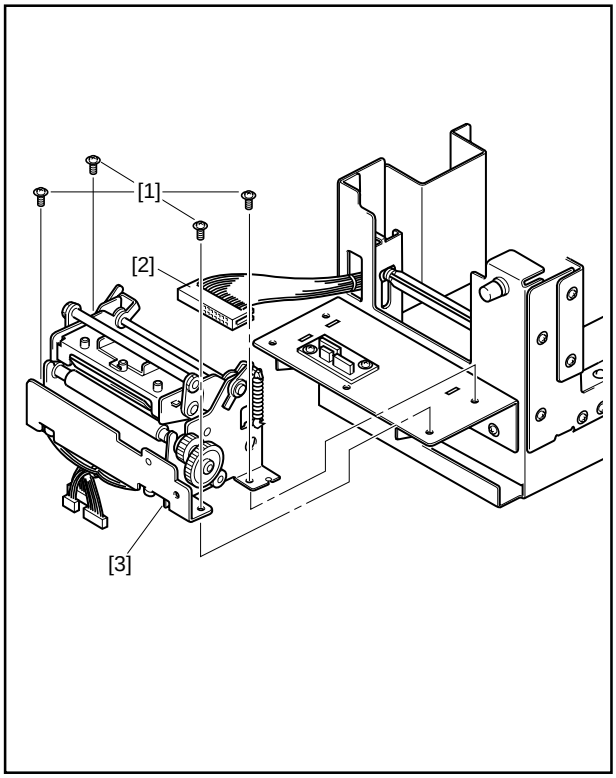
(1) Disconnect the power cord from the AC outlet.
(2) Remove:
- Screws 4 pcs. [1]
- Presenter Holder L and R [2]
- Presenter [3]
  Refer to Step 4 to remove the connector which is connected to the main logic board from the Presenter.

2. Cutter

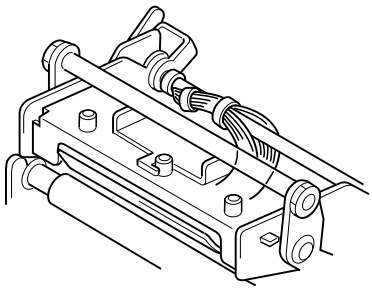


(2) Remove:
- The presenter in Step 1.
- Screws 5 pcs. [1]
- Cutter Holder L and R [2]
- Cutter [3]
  Refer to Step 4 to remove the connector which is connected to the main logic board from the Cutter.

3. Printer Mechanism

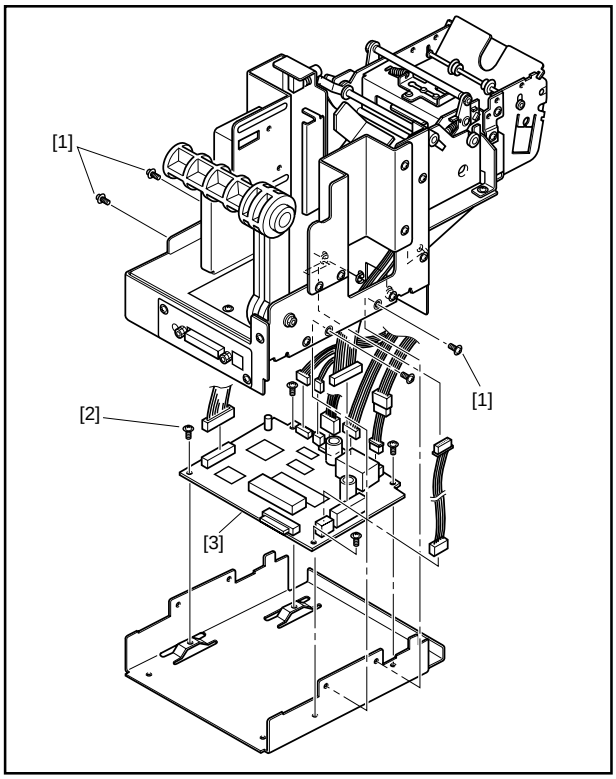


(1) Remove the power supply connector.
(2) Remove:
- Screws 4 pcs. [1]
- Connector [2]
  Cut the wire band in four places.



- Printer Mechanism [3]
  Refer to Step 4 to remove the connector which is connected to the main logic board from the printer mechanims.

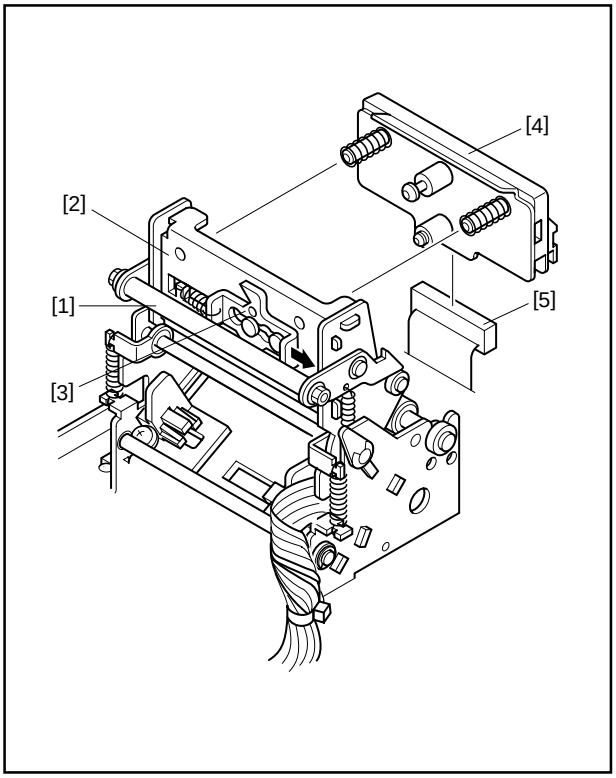
4. Main Logic Board



(1) Remove the power supply connector.
(2) Remove:
- Four screws [1]
- Wiring band
- Connectors
- Screws 4 pcs. [2]
- Main Logic Board [3]

When removing the wiring band, check which one is the lead wire.

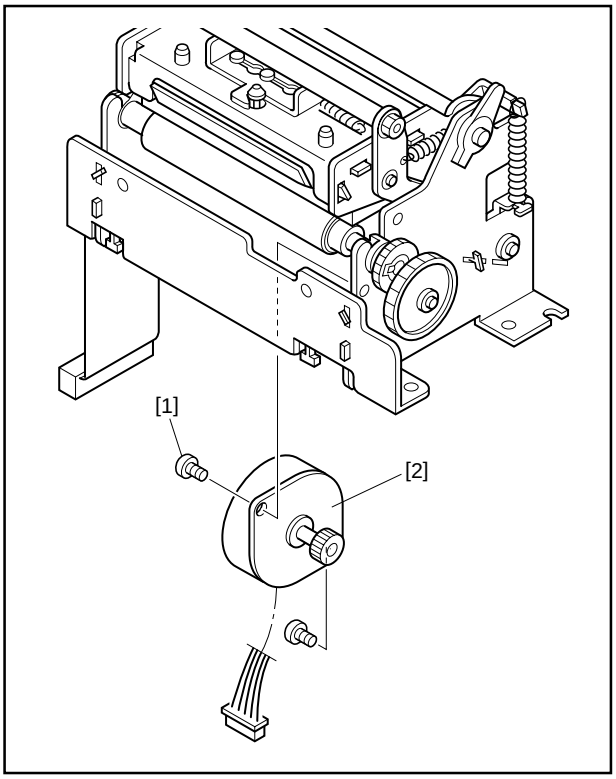
5. Print Head Unit



(1) Pull the pressure stay [1] forward to open the head frame unit [2].
(2) Slide the head clamp [3] in the direction indicated by the arrow. Remove the print head unit [4].
(3) Remove the head connector [5].

Note :Be careful to avoid damaging the heat elements when installing the replacement unit.

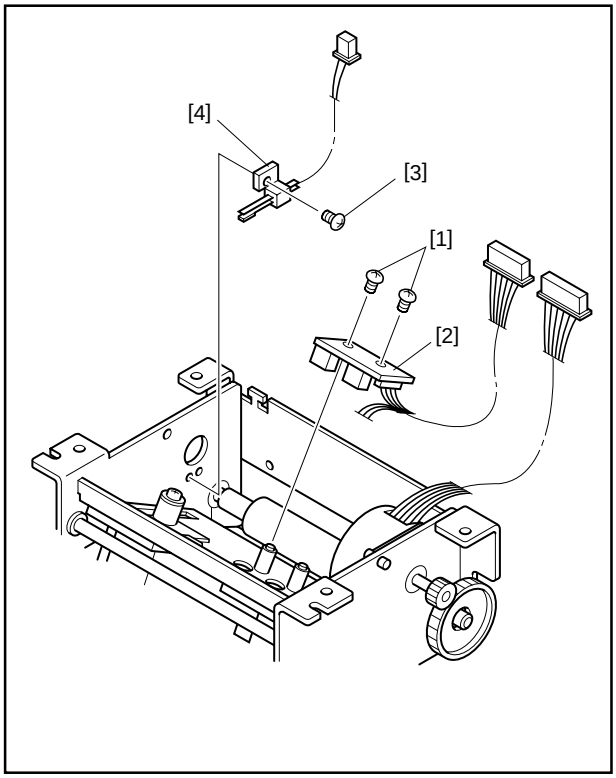
6. Feed Motor Assembly



(1) Remove:
- Printer mechanism (See 3. above.)
- Wiring band holding the lead wire.
- Screws 2 pcs. [1]
- Feed motor [2]

7. Sensor Unit

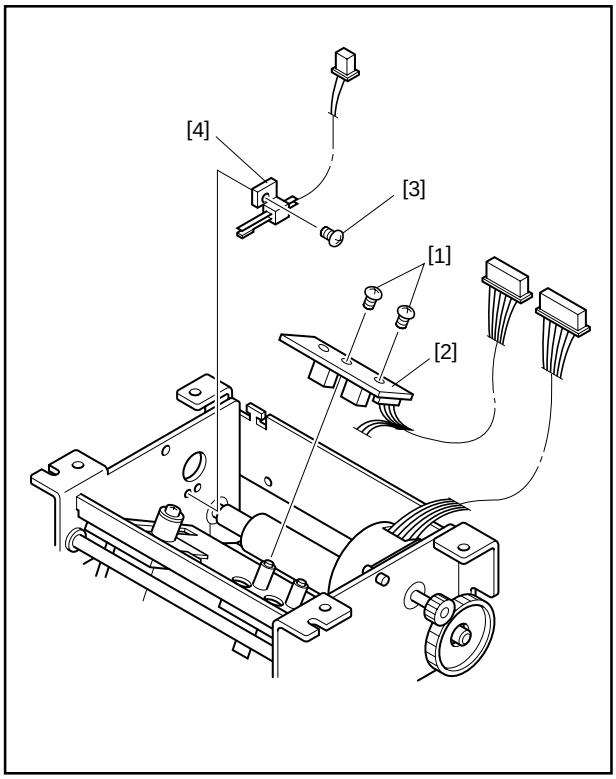
Old Type



(1) Remove:
- Printer mechanism (See 3. above.)
- Two wire band screws holding the lead wire [1].
- Screws 2 pcs. [1]
- Transmit sensor [2]
- Screw 1 pc. [3]
- Head-up sensor [4]

Note: There are two types of transmit sensors. One is for the old type and the other is for the new type.

New Type



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CHAPTER 4
MAINTENANCE AND LUBRICATION

This chapter explains printer maintenance and lubrication.

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1-1. Cleaning 36

1-2. Checks 36

2. Lubrication 37

2-1. Lubricants 37

2-2. Application Method 37

2-3. Lubrication Points 37

1. Maintenance

Proper maintenance is necessary to maintain printer performance and forestall potential problems. Please carry out maintenance as described below.

1-1. Cleaning

(1) Surface dirt

Clear away dirt with a soft cloth. If necessary, apply a small quantity of alcohol to the cloth to improve cleaning power. NEVER use thinner, trichlene, or ketone solvents, as these can cause damage to plastic components.

When cleaning, take care to avoid damaging or moistening of electronic parts, mechanical parts, and wires.

(2) Internal dust

For best results, use an electric vacuum cleaning device to remove dust from the inside of the printer. Note that such cleaning may also remove lubrication; when you have finished cleaning, check lubrication levels and apply lubricant as necessary.

1-2. Checks

There are two types of maintenance checks. Simple “daily checks” can be performed by users during the course of daily operation. “Periodic checks” must be carried out by qualified service personnel.

(1) Daily checks

- Check whether dirt or other foreign matter has worked its way into the printer, and remove as necessary.
- Check the thermal head for excessive dirt. If the head is very dirty, clean it with a cotton stick or a soft cloth soaked in alcohol.

(2) Periodic checks

Periodic checks and lubrication should be carried out once every six months or once every million lines of printing.

- Check the integrity of springs.
- Clear dust from areas around the detectors.

2. Lubrication

Proper lubrication is essential for maintaining the printer's performance level and preventing breakdowns or other problems.

2-1. Lubricants

Choice of lubrication can significantly affect the printer's performance, longevity, and low-temperature characteristics. We recommend the following lubricant for the TSP400 series.

Type	Name	Manufacturer
Grease	Molykote EM	Dow Corning

2-2. Application Method

If you are lubricating parts during disassembly or reassembly, be sure to wash or wipe the parts thoroughly to remove all dirt and dust prior to lubricating.
Remember that cleaning can remove necessary lubrication. Always lubricate after cleaning, disassembly, or replacement.

2-3. Lubrication Points

Apply lubricants at the following locations. (Refer to Diagram 4-1.)

No.	Location
[1]	Contact area of pressure bar and pressure pin
[2]	Contact area of gear 15×50×0.5 and gear shaft
[3]	Contact area of gear 58×0.5 and gear shaft
[4]	Contact area of gear 15×50×0.5 and PF motor gear
[5]	Contact area of gear 58×0.5 and platen gear
[6]	Contact area of head stay and head base frame
[7]	Contact area of head clamp and clamp pin
[8]	Contact area of head clamp and head stay R

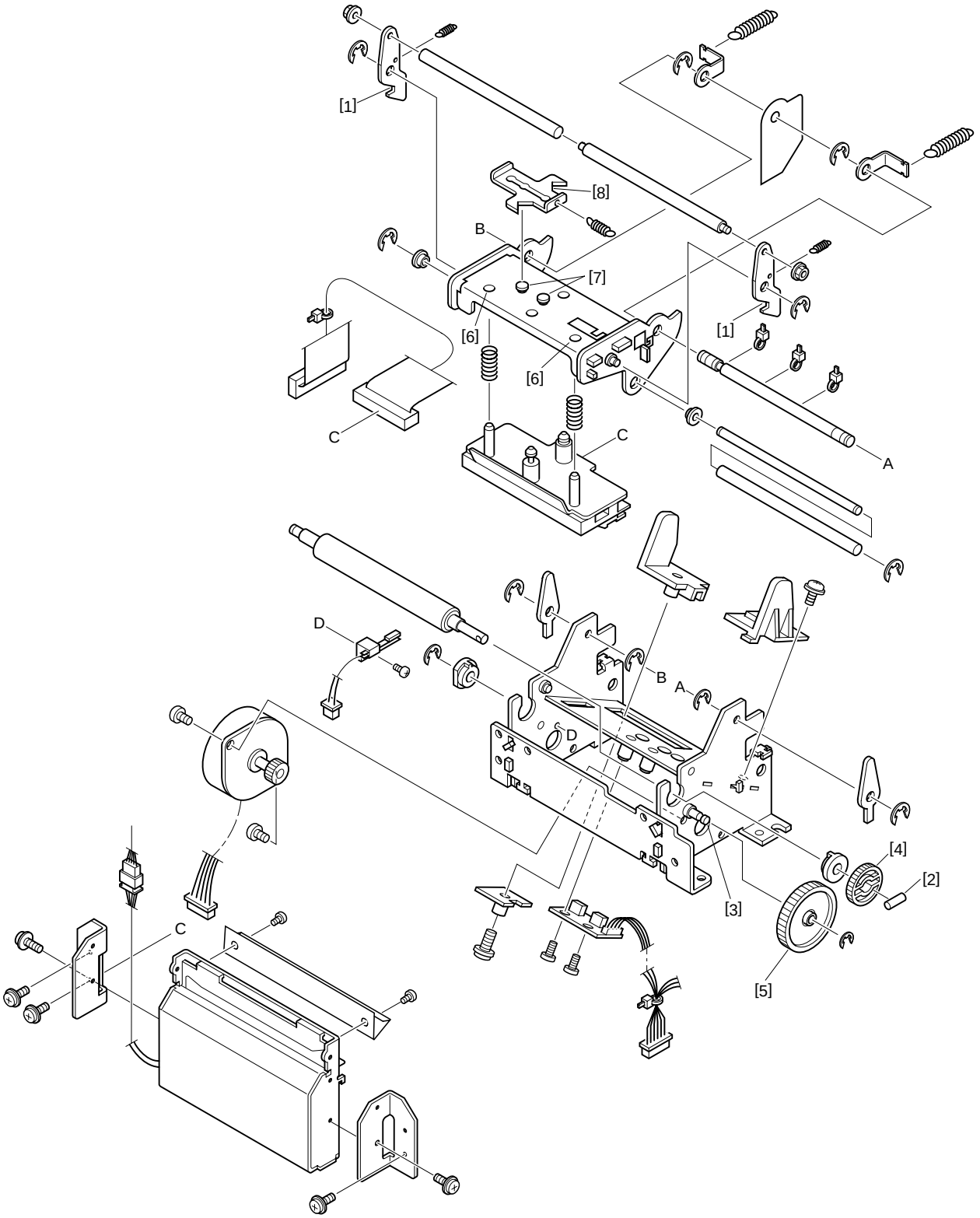

Fig. 4-1 Lubrication Points

CHAPTER 5
PARTS LIST

HOW TO USE PARTS LIST

(1) DRWG. NO.
This column shows the drawing number of the illustration.

(2) REVISED EDITION MARK
This column shows a revision number.
Part that have been added in the revised edition are indicated with "#"
Part that have been abolished in the revised edition are indicated with "*"
#1:First edition → Second edition *1:First edition → Second edition

(3) PARTS NO.
Parts numbers must be notified when ordering replacement parts. Parts described as "NPN" have no parts number and are not in stock, unavailable.

(4) PARTS NAME
Parts names must be notified when ordering replacement parts.

(5) Q'TY
This column shows the number of the part used as indicated in the figure.

(6) REMARKS
This column is used for general comments. It also indicates EPROM seal numbers. A"*" within a seal number indicates the version number.

(7) RANK
Parts marked "S" are service parts. Service parts are recommended to be in stock for maintenance.

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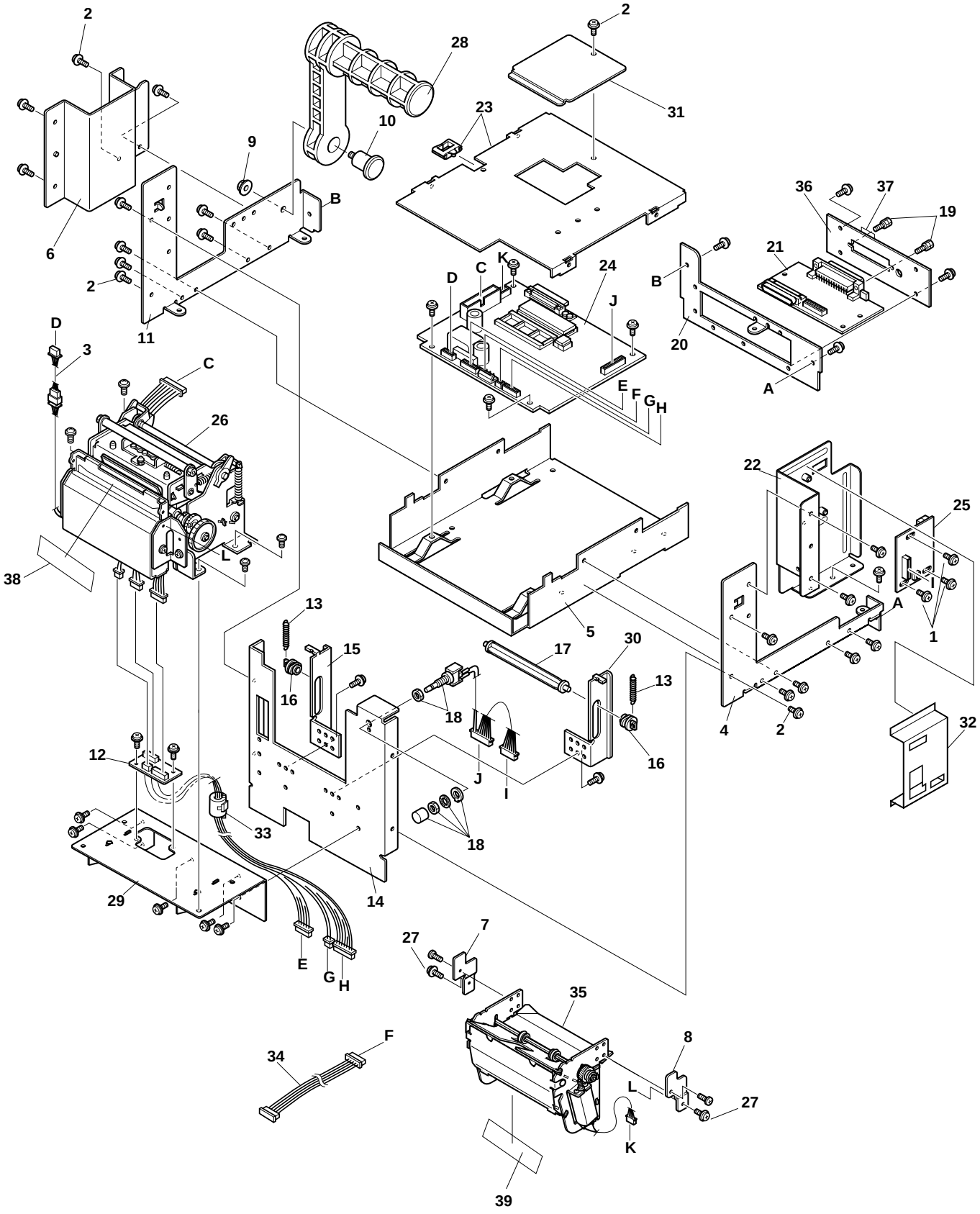
1. Printer Assembly

1-1. Disassembly Drawing



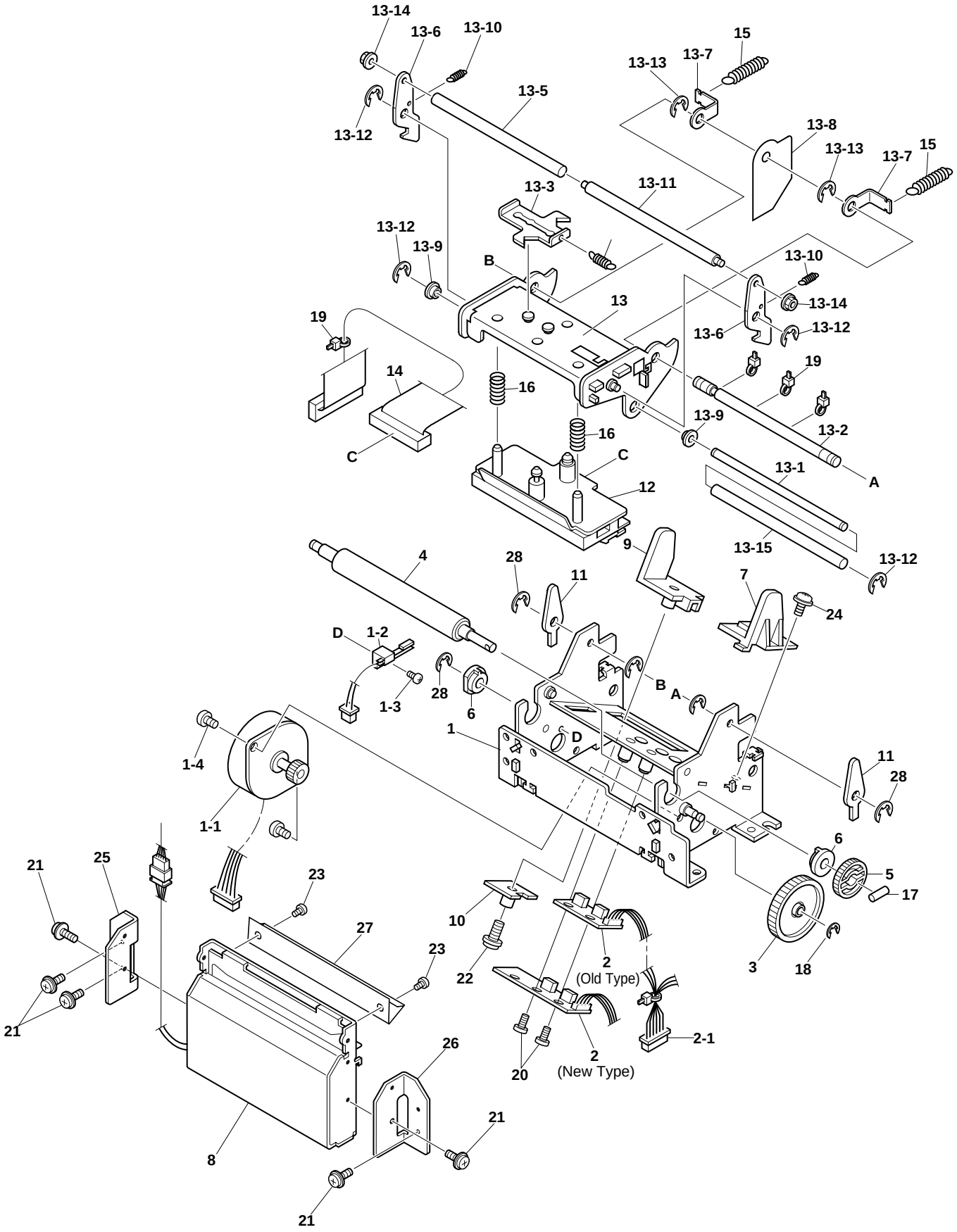
1-2. Parts List

Printer Assembly

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
1		01903059	SCREW TR 3-5 FL	3		S
2	*1	01903077	SCREW TAT 3-5 CT-FL	41		S
	#1	01903101	SCREW TAT 3-6 CT-FL	41		S
3		30721610	CUTTER CABLE UNIT TUP4	1	TUP452,TUP482VER.1	
4		32000050	FRAME R TUP4	1		
5		32002211	BOTTOM FRAME TUP4	1		
6		32005120	PAPER FRAME L TUP4	1		
7		32041130	SNOUT HOLDER L TUP4	1	TUP482	
8		32041140	SNOUT HOLDER R TUP4	1	TUP482	
9		02040402	FLANGED NUT NHW4	1		S
10		31303211	ARM SHAFT TUP4	1		
11		32000060	FRAME L TUP4	1		
12		37427400	TRANSIT BOARD UNIT TUP4	1		S
13		30510510	SPRING E050-035-0235	2		S
14		32003211	FRONT FRAME TUP4	1		
15		32005020	CUSHION FRAME L TUP4	1		
16		33390010	CUSHION SHAFT TUP4	2		
17		83390020	ROLL PAPER SHAFT SP312	1		
18		37422500	PUSH SWITCH UNIT TUP4	1		
19		04991401	SCREW DBLC-J25SAF	2	RS232,RS422	S
20		32003020	REAR PLATE TUP4	1		
21		37407800	RS232C IF BOARD UNIT TSP4	1	RS232 VER.1	
	#1	37427620	INTERFACE BOARD R232 UNIT T4V2	1	RS232 VER.2	
		37407810	RS422 IF BOARD UNIT TSP4	1	RS422	
		37407820	PARALLEL IF BOARD UNIT TSP4	1	PARALLEL VER.1	
	#1	37427610	INTERFACE BOARD PARA UNIT T4V2	1	PARALLEL VER.2	
22		37420310	PAPER FRAME R UNIT TUP4	1		
23		37420510	COVER FRAME UNIT TUP4	1		
24		37427000	MAIN LOGIC BOARD UNIT TUP4	1	VER.1	S
		37427030	MAIN LOGIC BOARD UNIT T4V2	1	VER.2	S
25		37427300	NE BOARD UNIT TUP4	1		S
26		38405400	TMP452W-24N	1		S
27		01903090	SCREW TAT 3-8 CT-FL	2	TUP482	S
28		33490210	ARM TUP4	1		
29		32005311	MECHANISM FRAME TUP4	1		
30		32005010	CUSHION FRAME R TUP4	1		
31		82020361	ROM COVER SP312	1		
32		30093010	ESD GUARD SHEET TUP4	1		
33		09990713	FERRITE CORE TFC-16-8-16	1		
34		30721650	POWER CABLE UNIT TUP4	1		
35		38511201	PR112-24	1	TUP482	
36		32021010	SERIAL IF PLATE TSP4	1	RS232,RS422	
		32021110	PARALLEL IF PLATE TSP4	1	PARALLEL	
37	#1	30091010	TENSION SHEET TSP2	1		
38	#1	30992010	DISCHARGE BRUSH T4V2	1	TUP482 VER.2	
39	#1	30992020	DISCHARGE SHEET T4V2	1	TUP482 VER.2	

2. Printer Mechanism

2-1. Disassembly Drawing



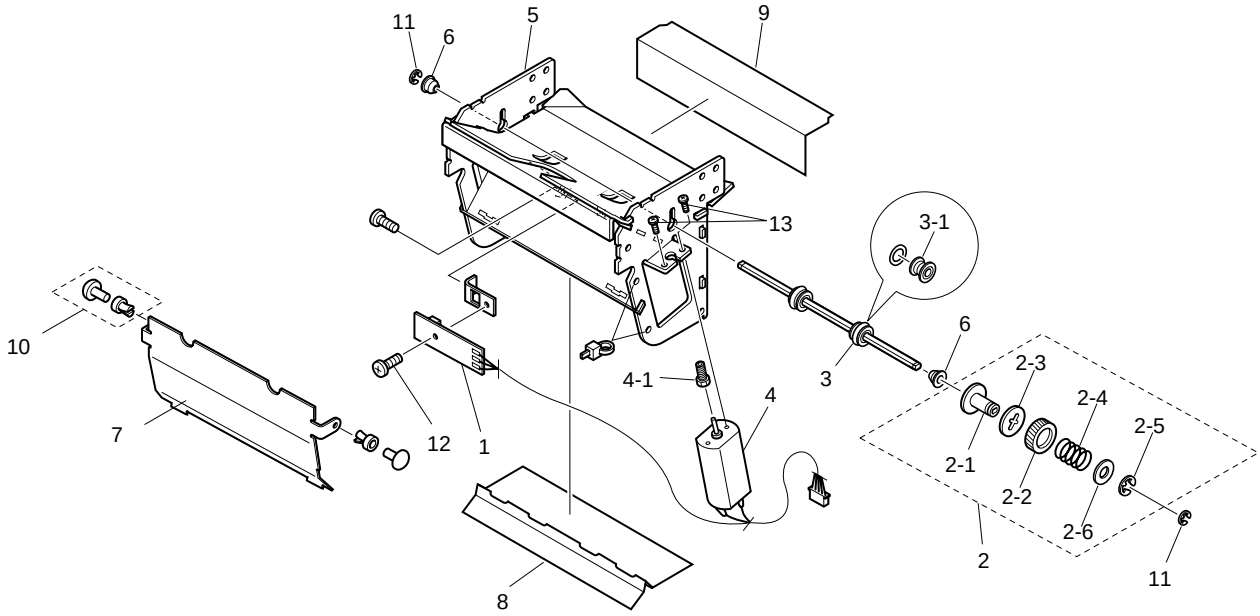
2-2. Parts List

Printer Mechanism

DRWG.NO.	REV.	PARTS NO.	PARTS NAME		Q'TY	REMARKS	RANK
1		NPN	FRAME ASSY	TMP4	1		
1-1		37412300	PF MOTOR ASSY	TMP4	1		S
1-2		87340390	HEAD DETECTOR ASSY	BMP8	1		S
1-3		00920503	SCREW TAT 2-5 CT		1		S
1-4		00930403	SCREW TAT 3-4 CT		2		S
2		37417000	REFLECT SENSOR BD UNIT	TMP4	1	OLD TYPE	S
		37417020	TRANSMIT SENSOR BD UNIT B	TMP4	1	NEW TYPE	S
2-1		30721010	CABLE UNIT	TMP4	1		S
3		83100460	IDLER GEAR 15X50X0.5		1		S
4		31375211	PLATEN	TMP4	1		S
5		33102210	GEAR 28X0.5	TMP4	1		S
6		80203041	DRIVE SHAFT BEARING	MP300	2		S
7		33910060	PAPER GUIDE C	TMP4	1		S
8		04991509	CUTTER AC310-24-LN		1		
9	*1	33910030	PAPER GUIDE B	TMP4	1		S
	#1	33910031	PAPER GUIDE B	TMP4	1		S
10		33903010	FRICTION PLATE	TMP4	1		S
11		33490010	HEAD POSITION LEVER	TSP4	2		
12		37419000	HEAD UNIT	TMP4	1		S
13		NPN	HEAD FRAME UNIT	TMP4	1		
13-1		81360850	PAPER GUIDE ROLLER	BMP4	1		
13-2	*1	81370920	HEAD UNIT HOLDER SHAFT	BMP4	1		
	#1	31303010	HEAD UNIT HOLDER SHAFT	TMP4	1		
13-3		82902330	HEAD CLAMP	BMP4	1		
13-4		81370910	PRESSURE STAY	BMP4	1		
13-5		09991391	HEAT-SHRINK TUBE A-6.0 GRN		1		
13-6		82401370	PRESSURE LEVER	BMP4	2		
13-7		82401360	HEAD STOPPER LEVER	BMP4	2		
13-8		80994252	GUARD SHEET	BMP4	1		
13-9		04310401	OILESS BUSHING F4X7X3		2		
13-10		80511070	SPRING E040-040-0159		2		S
13-11		80510840	SPRING E055-060-0180		1		S
13-12		04020015	STOP RING SE3.0		4		S
13-13		04020016	STOP RING SE4.0		2		S
13-14		02040301	FLANGED NUT NHW3		2		S
13-15		09991372	HEAT-SHRINK TUBE 4.0		1		S
14		80705031	CABLE UNIT 26X290CC	BMP4	1		
15		30510410	SPRING E065-070-0238		2		S
16		30520210	SPRING C075-080-0165		2		S
17		04012003	ROLL PIN SP2.0X8		1		S
18		04020010	STOP RING SE2.0		1		S
19		04991204	FASTENER T18S		8		S
20		00630404	SCREW TR 3-4		2		S
21		01903077	SCREW TAT 3-5 CT-FL		5		S
22		01914035	SCREW TAT 4-10 PT-FL		1		S
23		00820304	SCREW TR 2-3		2		S
24		01903090	SCREW TAT 3-8 CT-FL		1		S
25		32041110	CUTTER HOLDER L	TSP4	1		
26		32041120	CUTTER HOLDER R	TSP4	1		
27		32045220	GUIDE B	AC3	1		
28		04020016	STOP RING SE4.0		5		S

3. Presenter-Assembly

3-1. Disassembly Drawing



3-2. Parts List

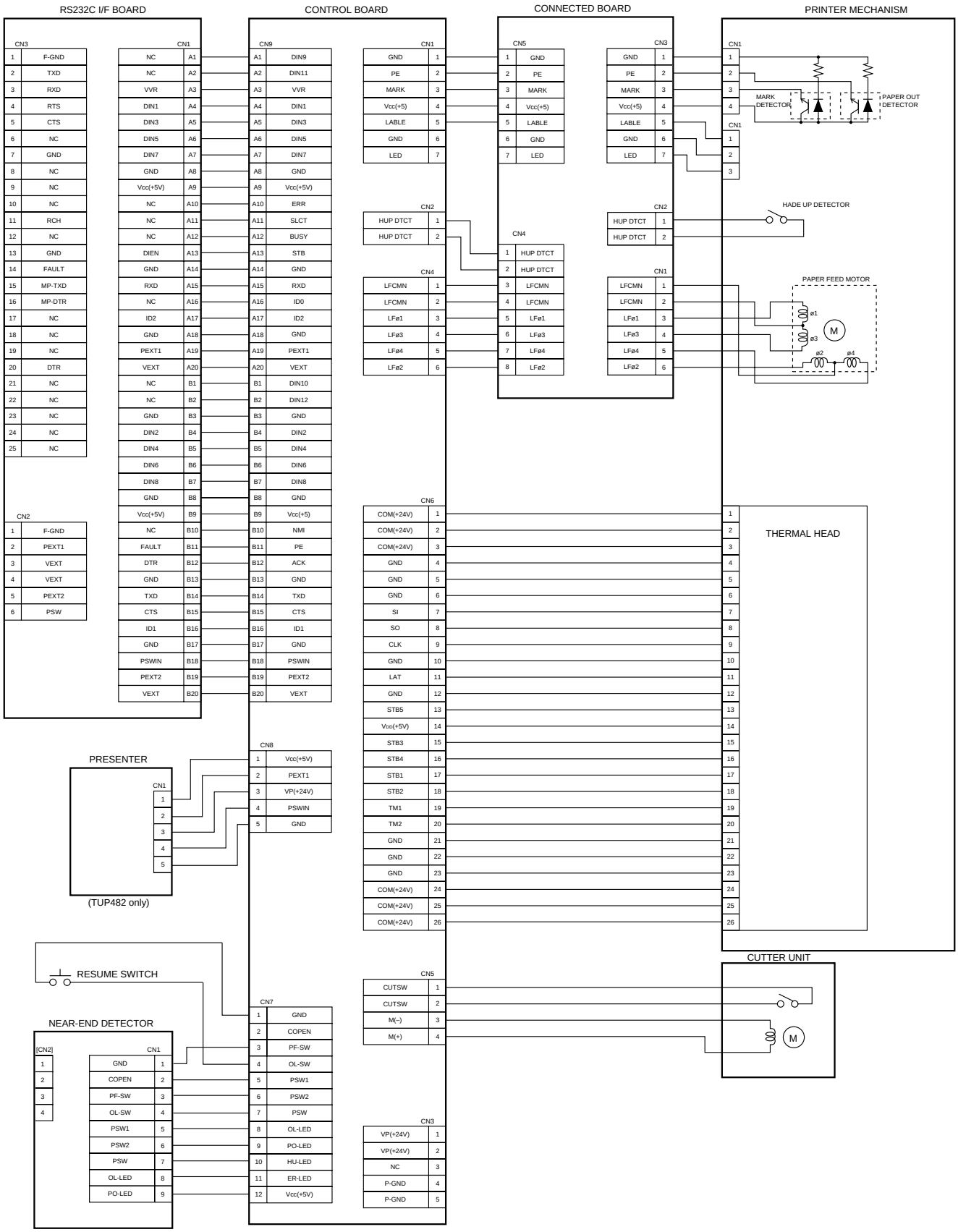
Presenter-Assembly

DRWG.NO.	REV.	PARTS NO.	PARTS NAME		Q'TY	REMARKS	RANK
1		37517000	DETECTOR BOARD UNIT	PR1	1		S
2		37514010	SLIP GEAR UNIT	PR1	1		S
2-1		33120210	SLIP WHEEL	PR1	1		
2-2		33101410	SLIP GEAR	PR1	1		
2-3		32012010	SLIP PLATE	PR1	1		
2-4		30520510	SPRING C111-080-0090		1		
2-5		04020017	STOP RING SE5.0		1		
2-6		02206002	PLAIN WASHER WF6X13X1.0		1		
3		37513010	PAPER FEED ROLLER UNIT	PR1	1		
3-1		04300781	O-RING 7.8X1.9JIS3P8		1		S
4		37512010	PAPER FEED MOTOR UNIT	PR1	1		
4-1		33140020	WORM GEAR	PR1	1		S
5		37510010	FRAME UNIT	PR1	1		
6		33215010	PF ROLLER BEARING	PR1	2		
7		32025010	UPPER COVER	PR1	1		
8		30045040	GUIDE D	PR1	1		S
9		30045011	GUIDE A	PR1	1		S
10		04033001	PUSH RIVET P3035B		2		
11		04020010	STOP RING SE2.0		2		S
12		00930609	SCREW TAT 3-6 CT		1		S
13		00820304	SCREW TR 2-3		2		S

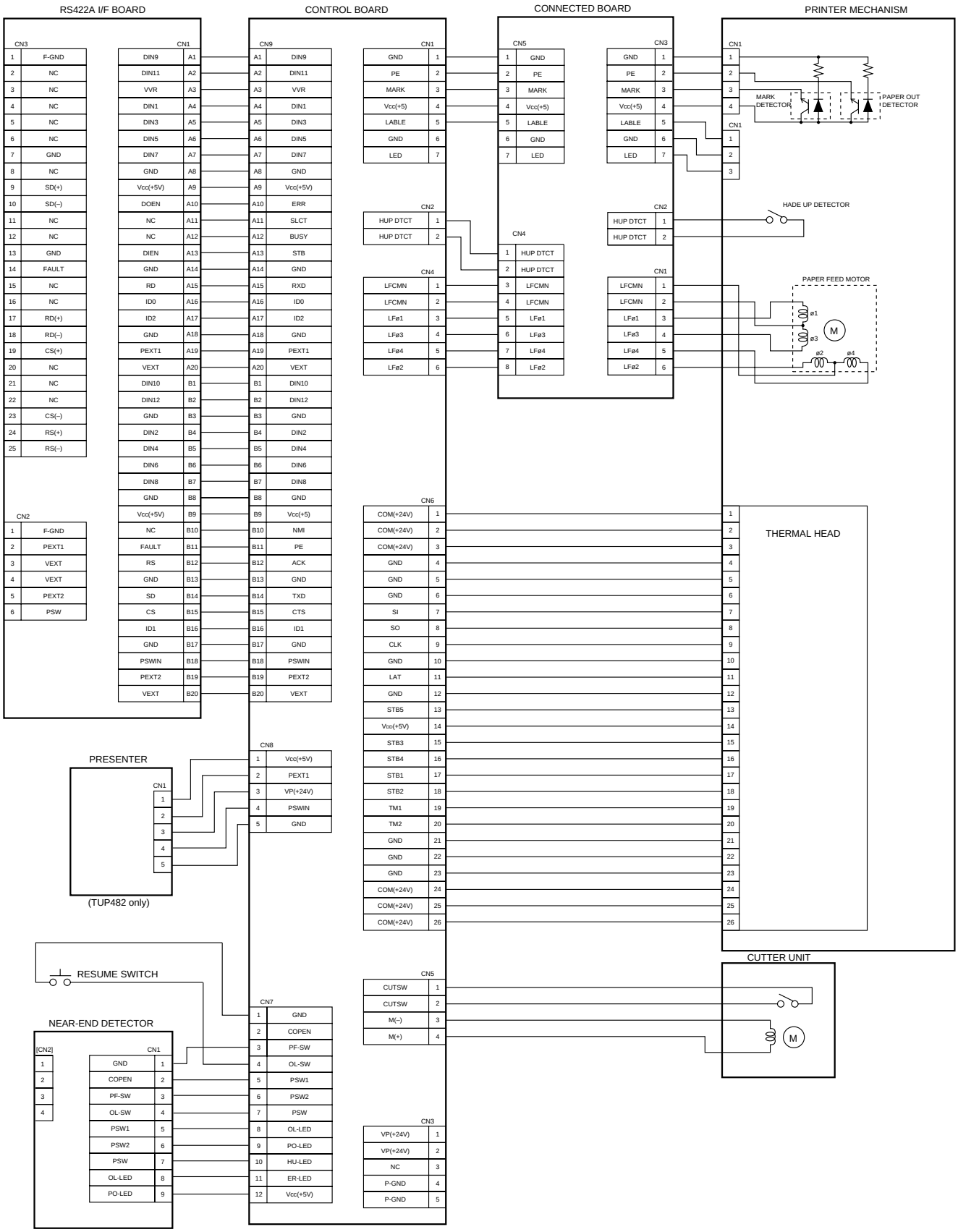
<Note 1> If DRWG. NO. 10 is removed, it should be replaced with new ones.

4. Wiring Scheme of Printer

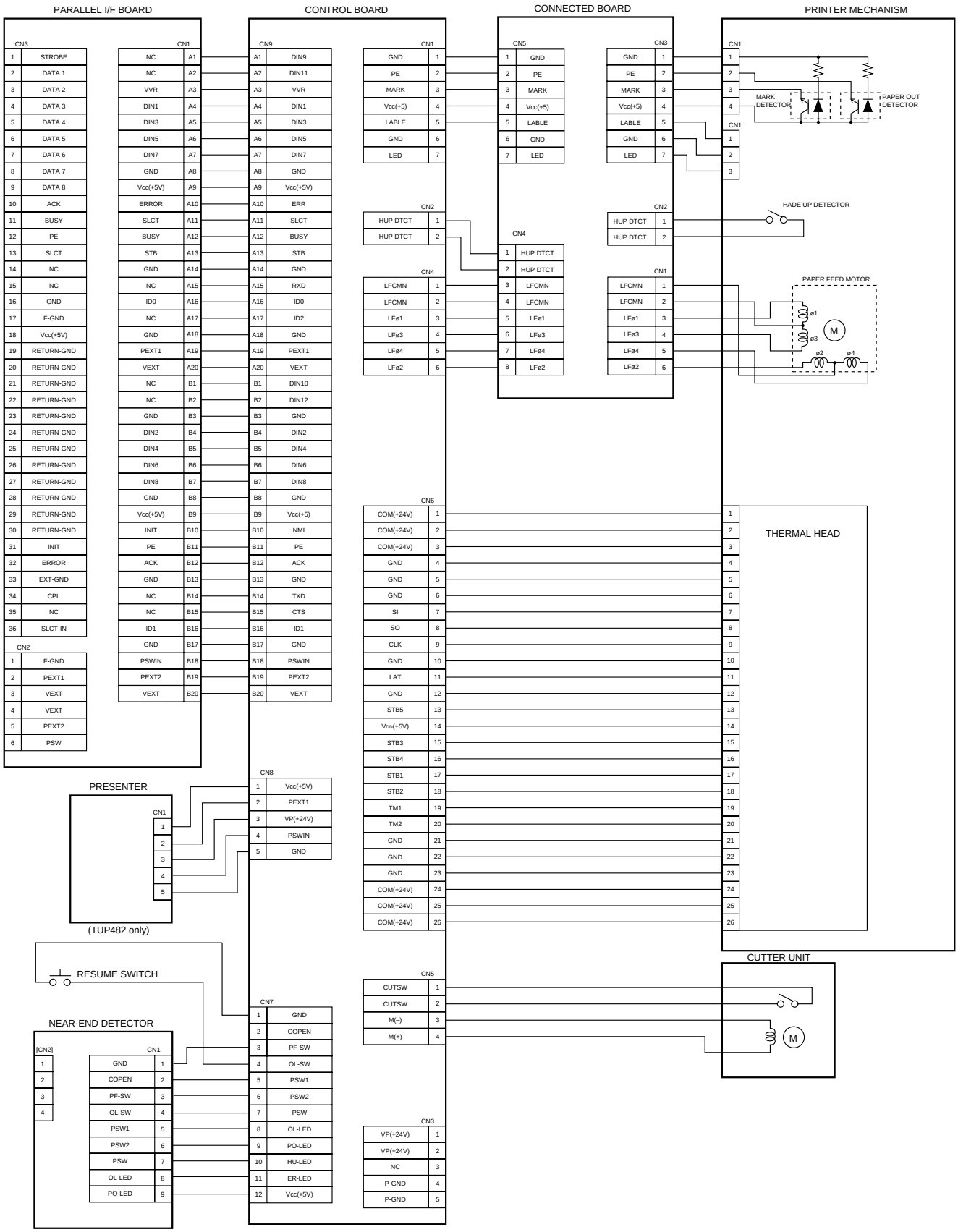
4-1. RS232 Interface Type



4-2. RS422A Interface Type

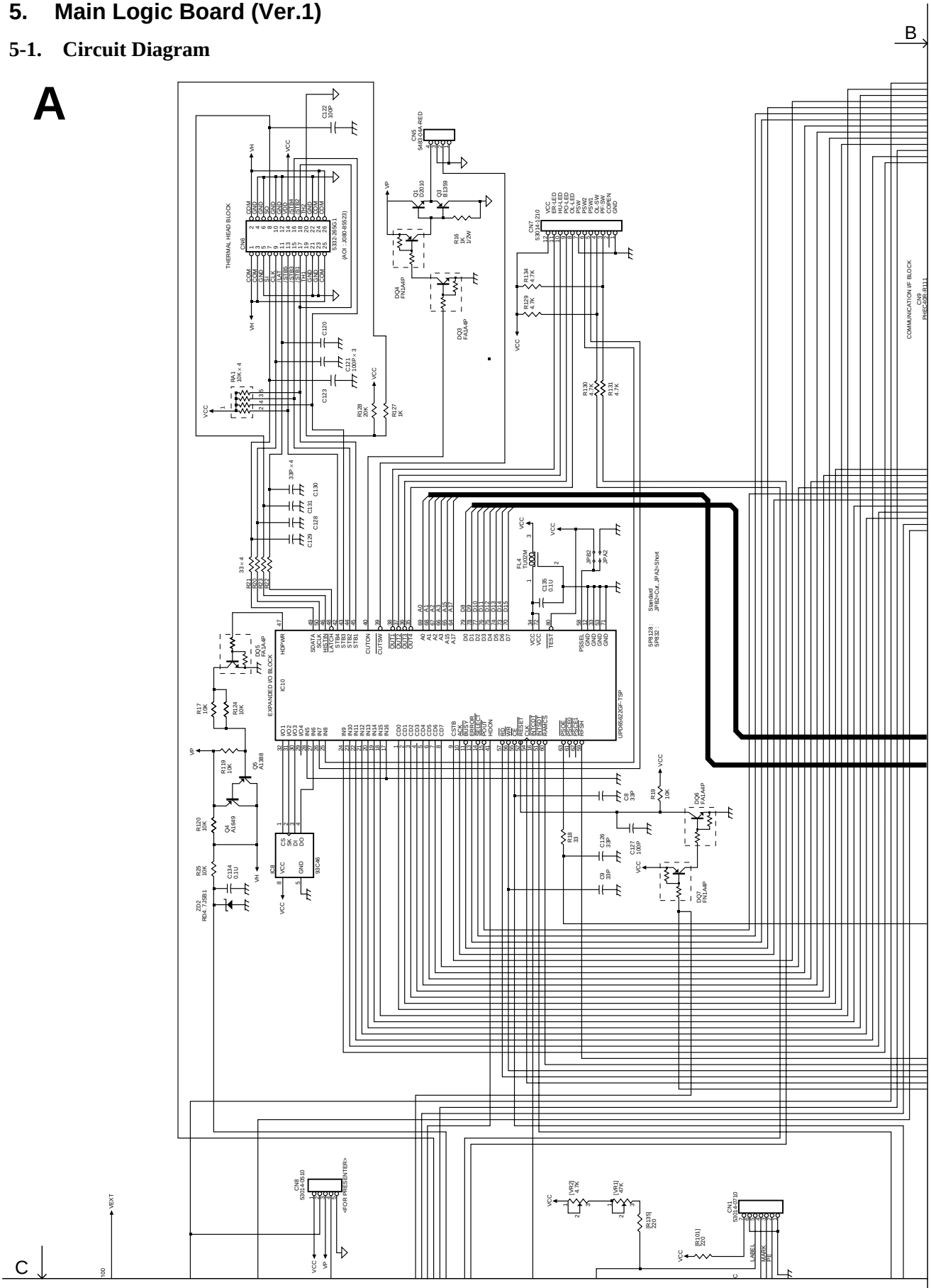


4-3. Parallel Interface Type

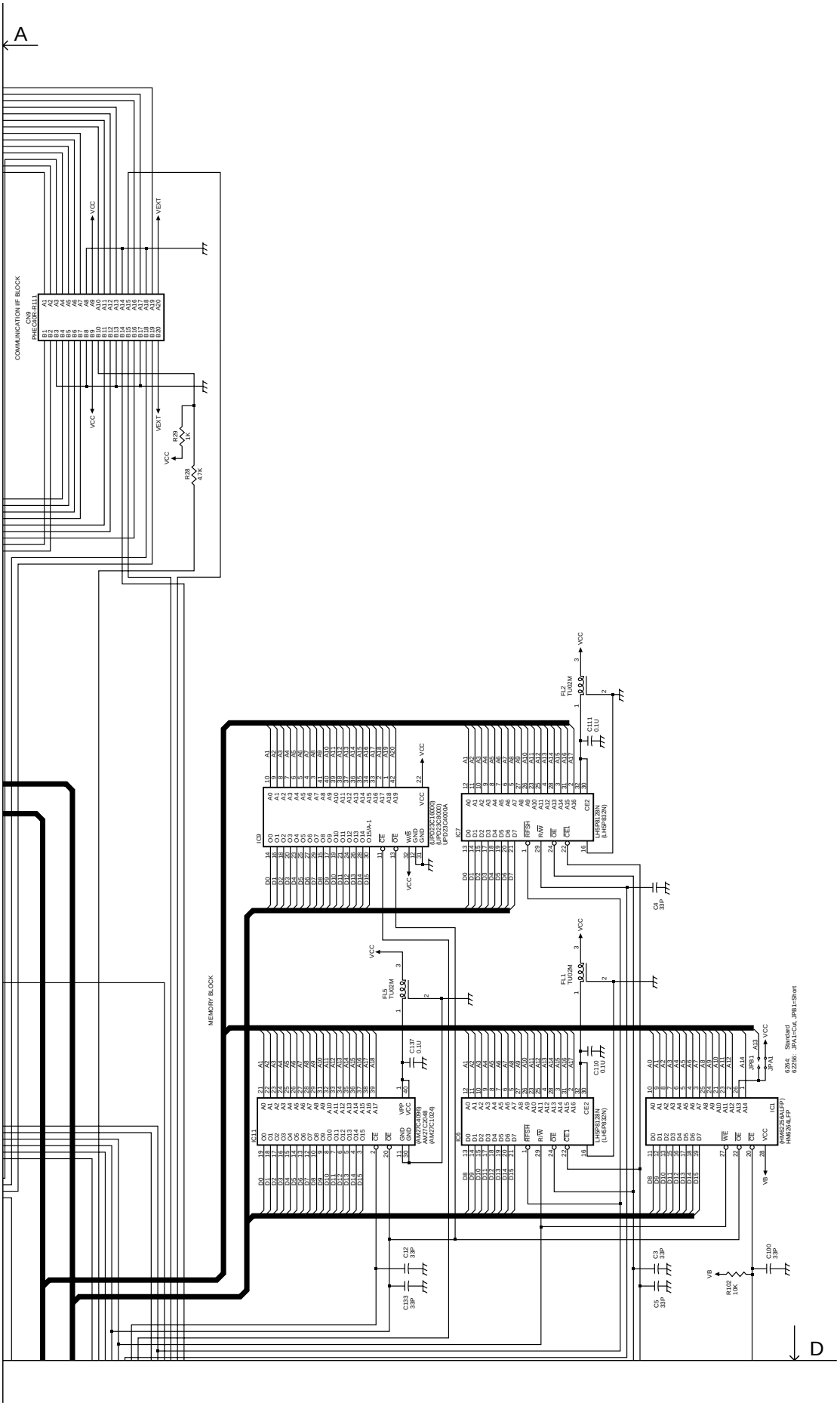


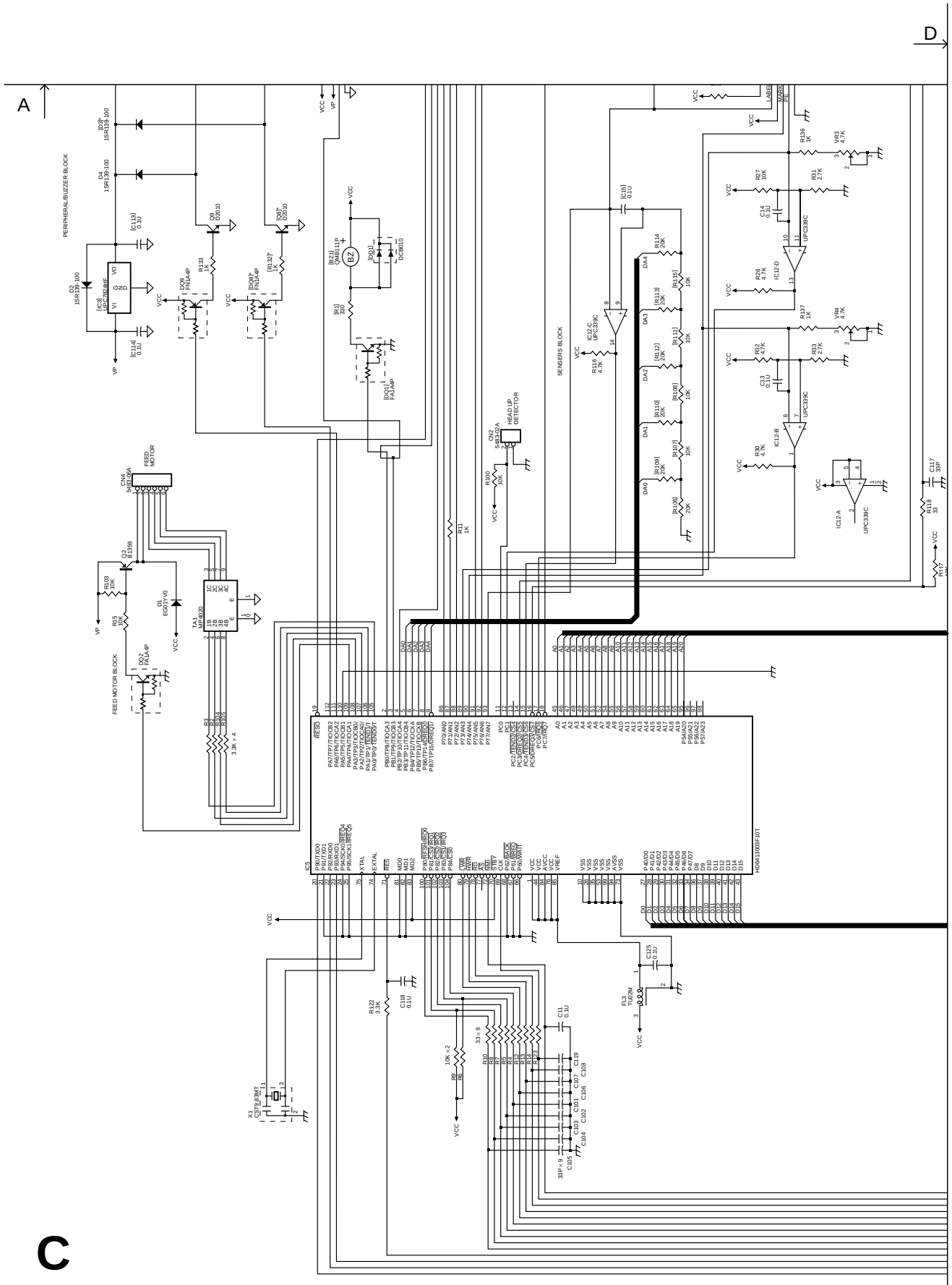
5. Main Logic Board (Ver.1)

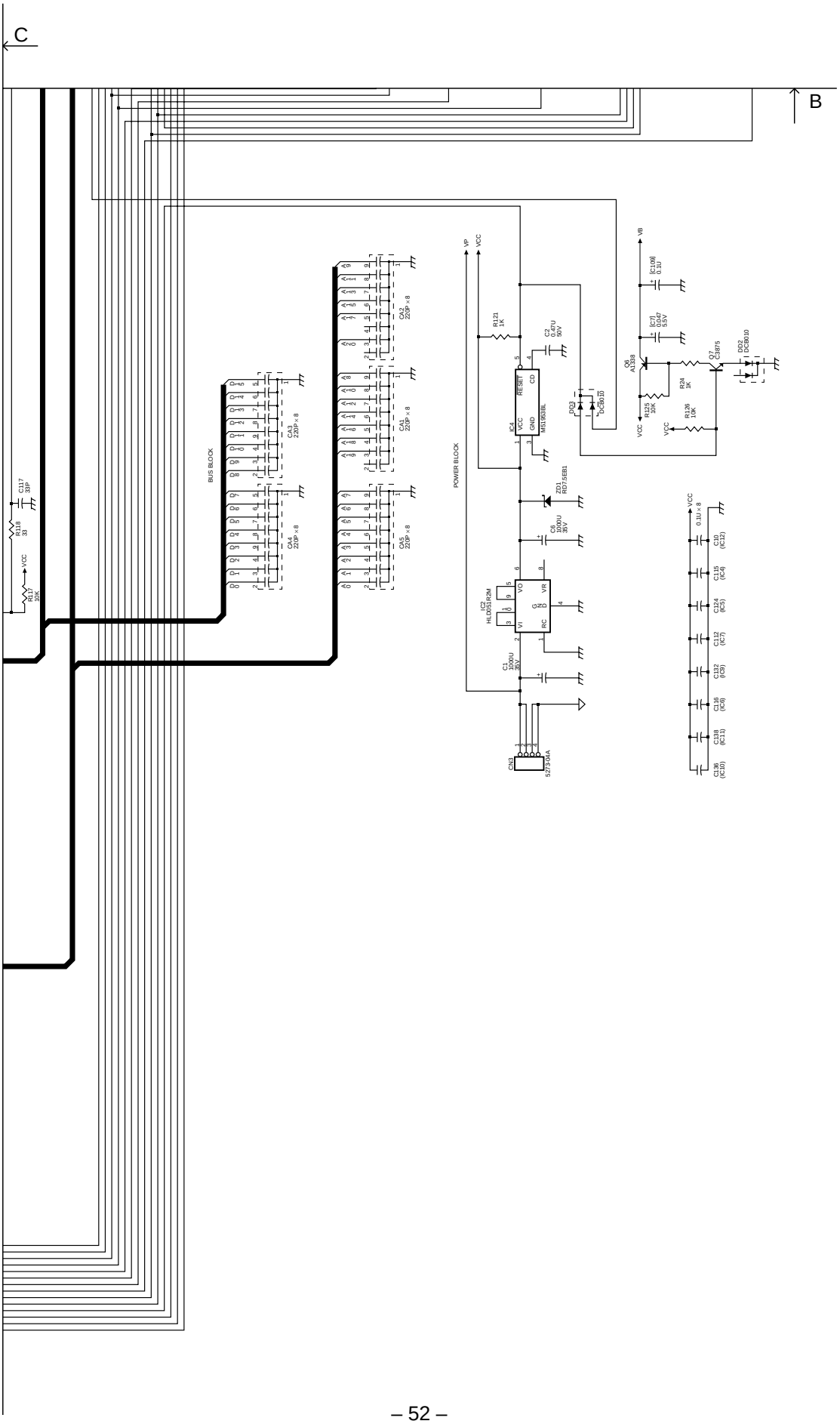
5-1. Circuit Diagram



<Note 1> The unit of resistor and resistor array is "Ω", and no indication of wattage means 1/6W, 1/8 respectively.
<Note 2> The unit of capacitor and capacitor array is "F", and no indication of Voltage means 50V.
<Note 3> The coimponents in the parentheses are not installed in the board.
<Note 4> ★-Not mounted on old type


A
B
D
COMMUNICATION I/F BLOCK
CN9
PHEC20R-B111
VCC
VEXT
R29
1K
R28
47K
MEMORY BLOCK
IC9
(UPD23C16000)
(UPD23C32000)
(UPD23C64000A)
IC27
LH5P1B128N
(LH5P1B128N)
FL2
TU00M
C111
0.1U
C4
33P
FL5
TU00M
C137
0.1U
FL1
TU00M
C110
0.1U
IC11
(AM27C4096)
(AM27C2048)
(AM27C1024)
IC5
LH5P1B128N
(LH5P1B128N)
IC1
HM62256LFP
HM6264LFP
JPA1
JPB1
6264: Standard
62256: JPA1=Cut, JPB1=Short
C12
33P
C133
33P
C3
33P
C5
33P
R100
10K
C100
33P


A
D
C
PERIPHERAL/BUZZER BLOCK
FEED MOTOR BLOCK
SENSERS BLOCK
HEAD UP DETECTOR
FEED MOTOR
HD6413003F10T
MB89P630
UPC339C
VCC
VP


C
B
D
BUS BLOCK
POWER BLOCK
VCC
VP
VB
IC2
HLD05R2M
IC4
M51953BL
ZD1
RD7.5EB1
DD3
DCB010
Q6
A1588
Q7
C4875
DD2
DCB010
CN3
5273-04A

5-2. Parts List

MAin Logic Board (Ver.1)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
C1		05041081	CHEM. CAPA. 1000UF 35V	1		
C2		05054745	CHEM. CAPA. 0.47UF 50V	1		
C3-5		05753304	CERA. CAPA. CHIP 33PF 50V	3		
C6		05041081	CHEM. CAPA. 1000UF 35V	1		
C7					NOT MOUNTED	
C8-9		05753304	CERA. CAPA. CHIP 33PF 50V	2		
C10-11		05751045	CERA. CAPA. CHIP 0.1UF 50V	2		
C12		05753304	CERA. CAPA. CHIP 33PF 50V	1		
C13-14		05751045	CERA. CAPA. CHIP 0.1UF 50V	2		
C15					NOT MOUNTED	
C100-108		05753304	CERA. CAPA. CHIP 33PF 50V	9		
C109-112		05751045	CERA. CAPA. CHIP 0.1UF 50V	4		
C113-114					NOT MOUNTED	
C115-116		05751045	CERA. CAPA. CHIP 0.1UF 50V	2		
C117		05753304	CERA. CAPA. CHIP 33PF 50V	1		
C118		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C119		05753304	CERA. CAPA. CHIP 33PF 50V	1		
C120-123		05751015	CERA. CAPA. CHIP 100PF 50V	4		
C124-125		05751045	CERA. CAPA. CHIP 0.1UF 50V	2		
C126		05753304	CERA. CAPA. CHIP 33PF 50V	1		
C127		05751015	CERA. CAPA. CHIP 100PF 50V	1		
C128-131		05753304	CERA. CAPA. CHIP 33PF 50V	4		
C132		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C133		05753304	CERA. CAPA. CHIP 33PF 50V	1		
C134-138		05751045	CERA. CAPA. CHIP 0.1UF 50V	5		
CA1-5		05652212	CAPA. ARRAY 220PF 50V 8EL	5		
R1					NOT MOUNTED	
R2-3		06753324	CHIP RESISTOR 3.3 K-OHM 1/10W	2		
R4-5		06753304	CHIP RESISTOR 33 OHM 1/10W	2		
R6		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R7-8		06753304	CHIP RESISTOR 33 OHM 1/10W	2		
R9		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R10		06753304	CHIP RESISTOR 33 OHM 1/10W	1		
R11		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R12-14		06753304	CHIP RESISTOR 33 OHM 1/10W	3		
R15		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R16		06021024	RD RESISTOR 1 K-OHM 1/2W	1		
R17		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R18		06753304	CHIP RESISTOR 33 OHM 1/10W	1		
R19		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R20-23		06753304	CHIP RESISTOR 33 OHM 1/10W	4		
R24		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R25		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R26		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R27		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R28		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R29		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R30		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R31		06752725	CHIP RESISTOR 2.7 K-OHM 1/10W	1		
R32		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R33		06752725	CHIP RESISTOR 2.7 K-OHM 1/10W	1		
R100		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R101					NOT MOUNTED	
R102-103		06751031	CHIP RESISTOR 10 K-OHM 1/10W	2		
R104-105		06753324	CHIP RESISTOR 3.3 K-OHM 1/10W	2		
R106-113					NOT MOUNTED	

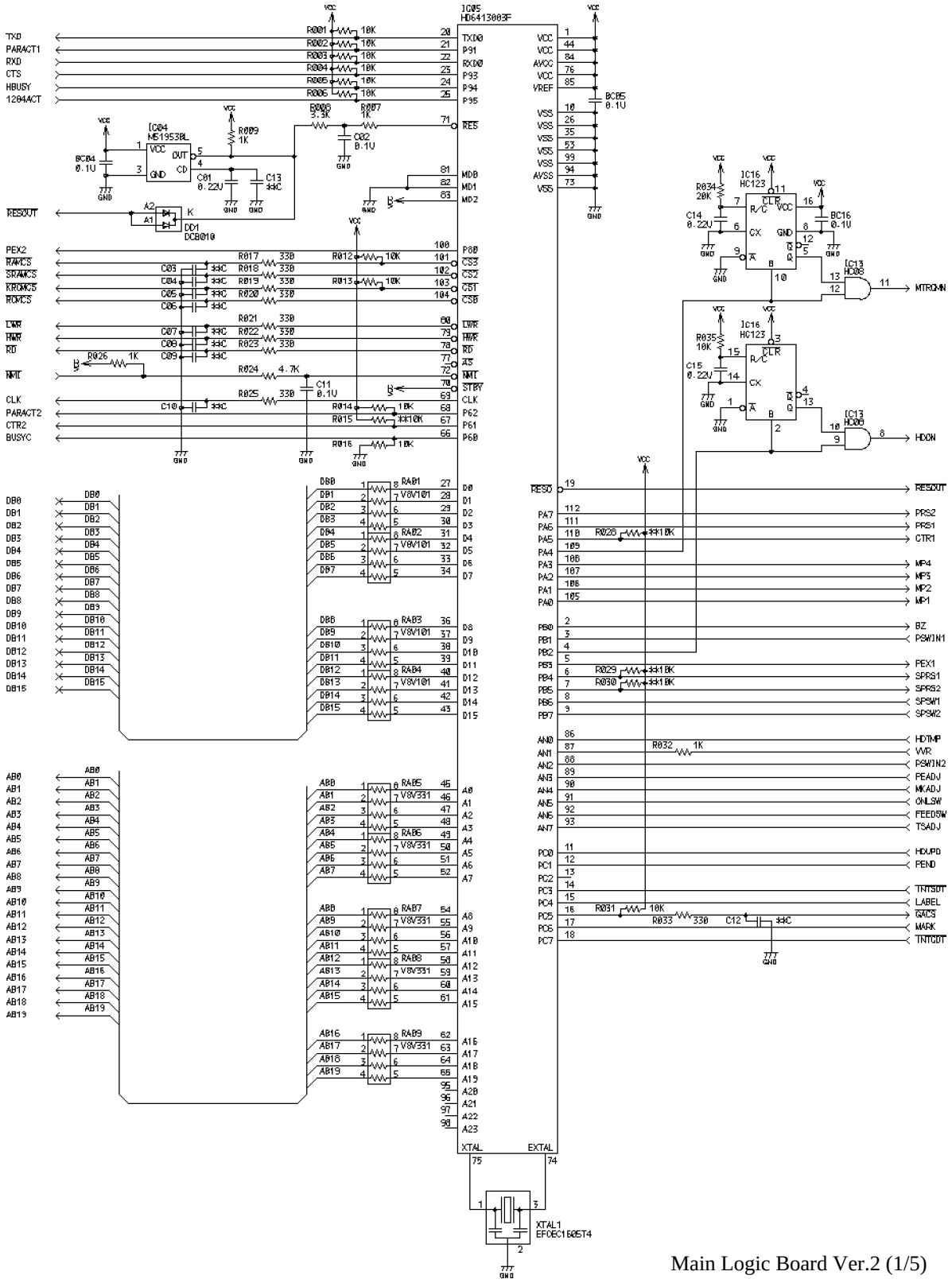
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R114		06752031	CHIP RESISTOR 20 K-OHM 1/10W	1		
R115					NOT MOUNTED	
R116		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R117		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R118		06753304	CHIP RESISTOR 33 OHM 1/10W	1		
R119-120		06751031	CHIP RESISTOR 10 K-OHM 1/10W	2		
R121		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R122		06753324	CHIP RESISTOR 3.3 K-OHM 1/10W	1		
R123		06753304	CHIP RESISTOR 33 OHM 1/10W	1		
R124		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R125					NOT MOUNTED	
R126		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R127		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R128		06752031	CHIP RESISTOR 20 K-OHM 1/10W	1		
R129-131		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	3		
R132		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1	FOR NEW TYPE ONLY	
R133		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R134		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R135					NOT MOUNTED	
R136-137		06751021	CHIP RESISTOR 1 K-OHM 1/10W	2		
RA1		06581039	RESIS. ARRAY 10 K-OHM 1/8W 4EL	1		
VR1-2					NOT MOUNTED	
VR3-4		06454721	RP RESISTOR RH0615CS-4.7K	2		
Q1		07320101	TRANSISTOR 2SD2010	1		
Q2-3		07113591	TRANSISTOR 2SB1359	2		
Q4		07016491	TRANSISTOR 2SA1649	1		
Q5-6		07013381	CHIP TRANSISTOR 2SA1338-67*TA	2		
Q7		07238754	CHIP TRANSISTOR 2SC3875S-G*AL	1		
Q8		07320101	TRANSISTOR 2SD2010	1	FOR NEW TYPE ONLY	
Q9		07320101	TRANSISTOR 2SD2010	1		
DQ1					NOT MOUNTED	
DQ2-3		07603016	DIGITAL TRANSISTOR FA1A4P	2		
DQ4		07603017	DIGITAL TRANSISTOR FN1A4P	1		
DQ5-6		07603016	DIGITAL TRANSISTOR FA1A4P	2		
DQ7		07603017	DIGITAL TRANSISTOR FN1A4P	1		
DQ8		07603017	DIGITAL TRANSISTOR FN1A4P	1	FOR NEW TYPE ONLY	
DQ9		07603017	DIGITAL TRANSISTOR FN1A4P	1		
TA1		07650054	TRANSISTOR ARRAY MP4020	1		
D1		08000048	DIODE EG01YV0	1		
D2		09990140	JUMPER WIRE 1/4W-L6.5-T	1		
D3		08000044	DIODE 1SR139-100AT	1	FOR NEW TYPE ONLY	
D4		08000044	DIODE 1SR139-100AT	1		
DD1					NOT MOUNTED	
DD2-3		08000047	DIODE CHIP DCB010	2		
ZD1		08020090	ZENER DIODE RD7.5EB1T	1		
ZD2		08020095	ZENER DIODE RD4.7JSB1	1		
IC1		08221043	SRAM 6264FP-100NS*EL	1		
IC2		08202020	IC-REG HLD051R2M	1		
IC3					NOT MOUNTED	
IC4		08200109	IC-RESET M51953BL	1		
IC5		08251006	CPU HD6413003F10T	1		
IC6-7		08221042	PSRAM 5P8128N-80L*E1	2		
IC8		08222047	EEPROM KM93C46	1		
		09110115	IC SOCKET DILB-8P-8J	1		
IC9		09110076	IC SOCKET DILB-42P-8J	1		
IC10		08240076	GATE ARRAY D65622GF-TSP	1		

Main Logic Board (Ver.1)

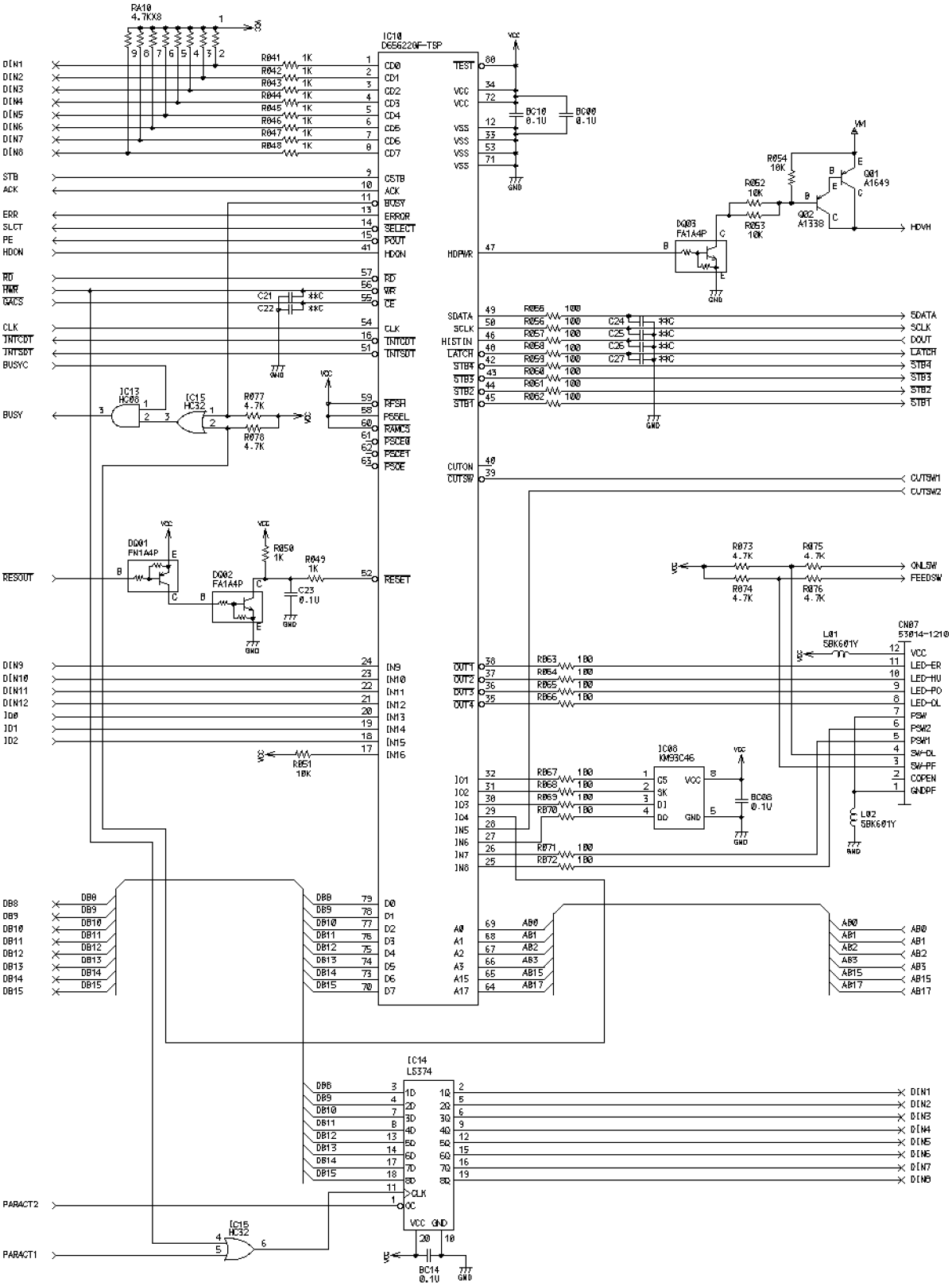
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC11		08222091	EPROM M5M27C202K-12	1		
		09110020	IC SOCKET DICF-40C-JAE	1		
IC12		08201022	IC-LIN HA17339F*TL	1		
CN1		09100370	CONNECTOR 53014-0710	1		
CN2		09100270	CONNECTOR 5483-02A	1		
CN3		09100614	CONNECTOR 5273-04A	1		
CN4		09100267	CONNECTOR 5483-06A	1		
CN5		09100532	CONNECTOR 5483-04AX-RED	1		
CN6		09100177	CONNECTOR 5332-26SG1	1		
CN7		09100444	CONNECTOR 53014-1210	1		
CN8		09100516	CONNECTOR 53014-0510	1		
CN9		09100610	CONNECTOR PHEC40R-R111	1		
X1		09250037	CERA. OSCILLATOR CST9.83MT	1		
FL1-5		09251119	LINE FILTER TU02MT*R	5		
BZ1					NOT MOUNTED	

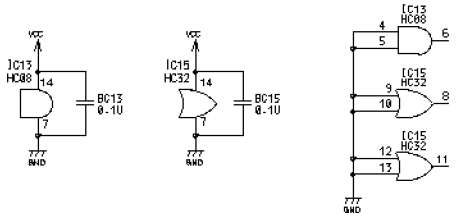
6. Main-Logic Board (Ver. 2)

6-1. Circuit Diagram

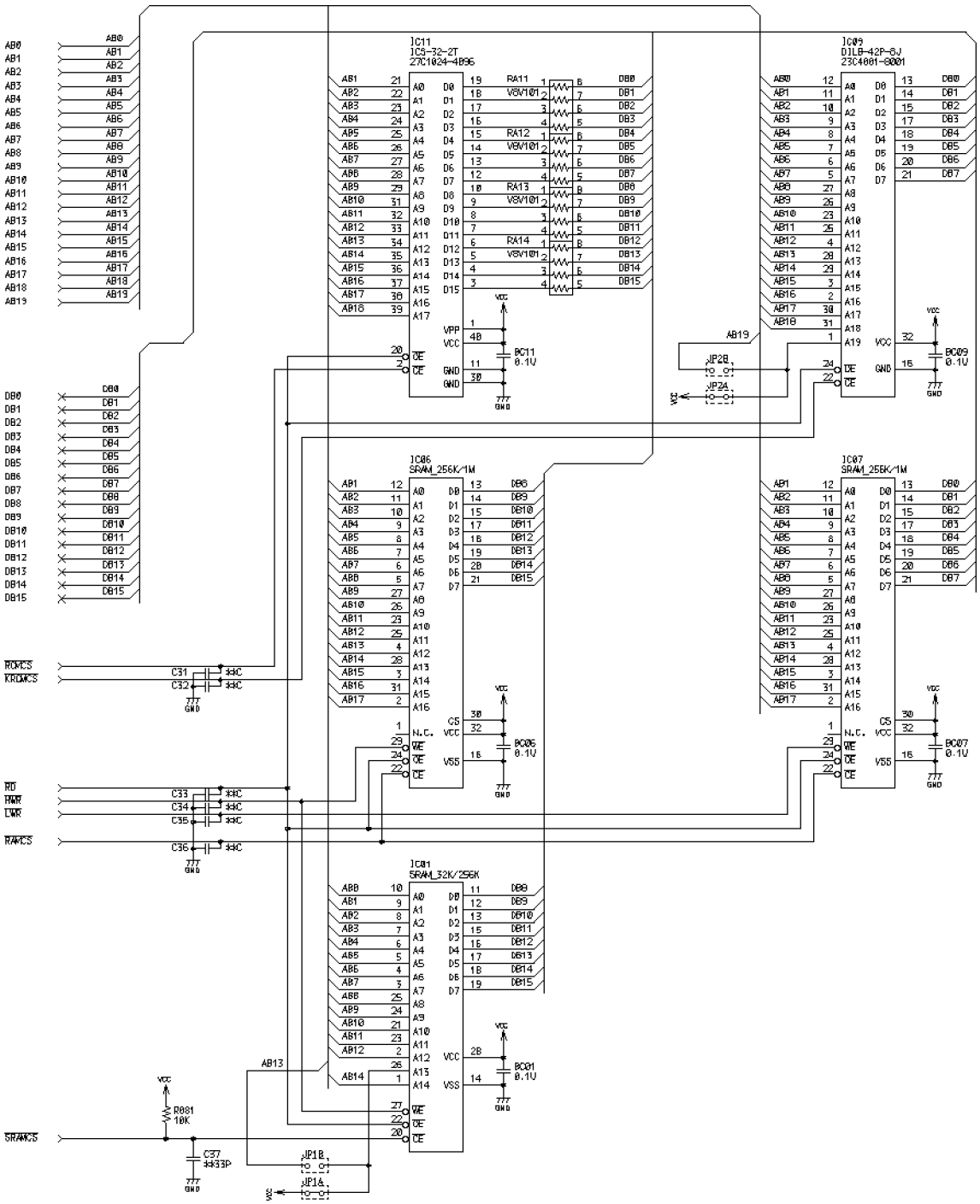


Main Logic Board Ver.2 (1/5)

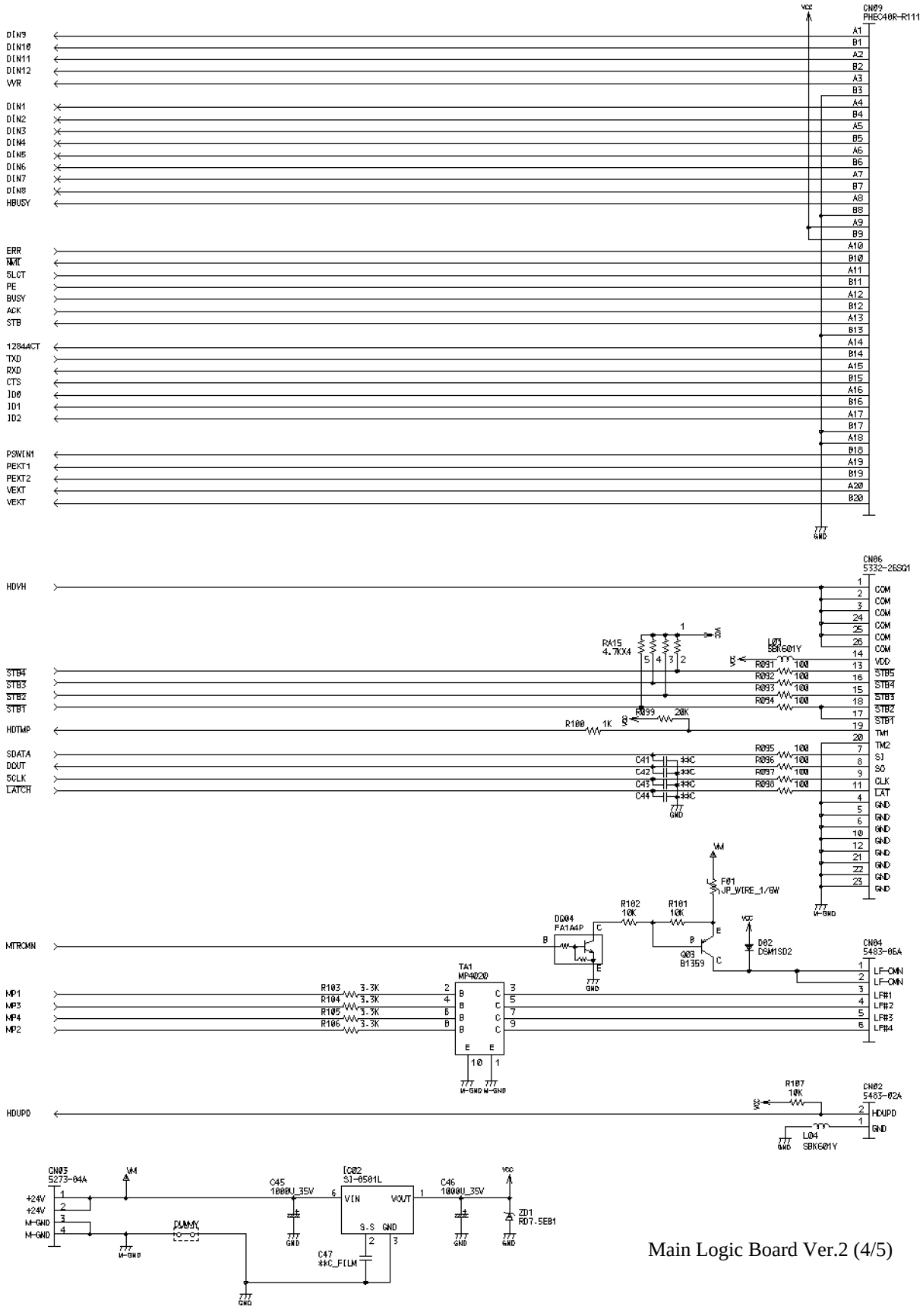




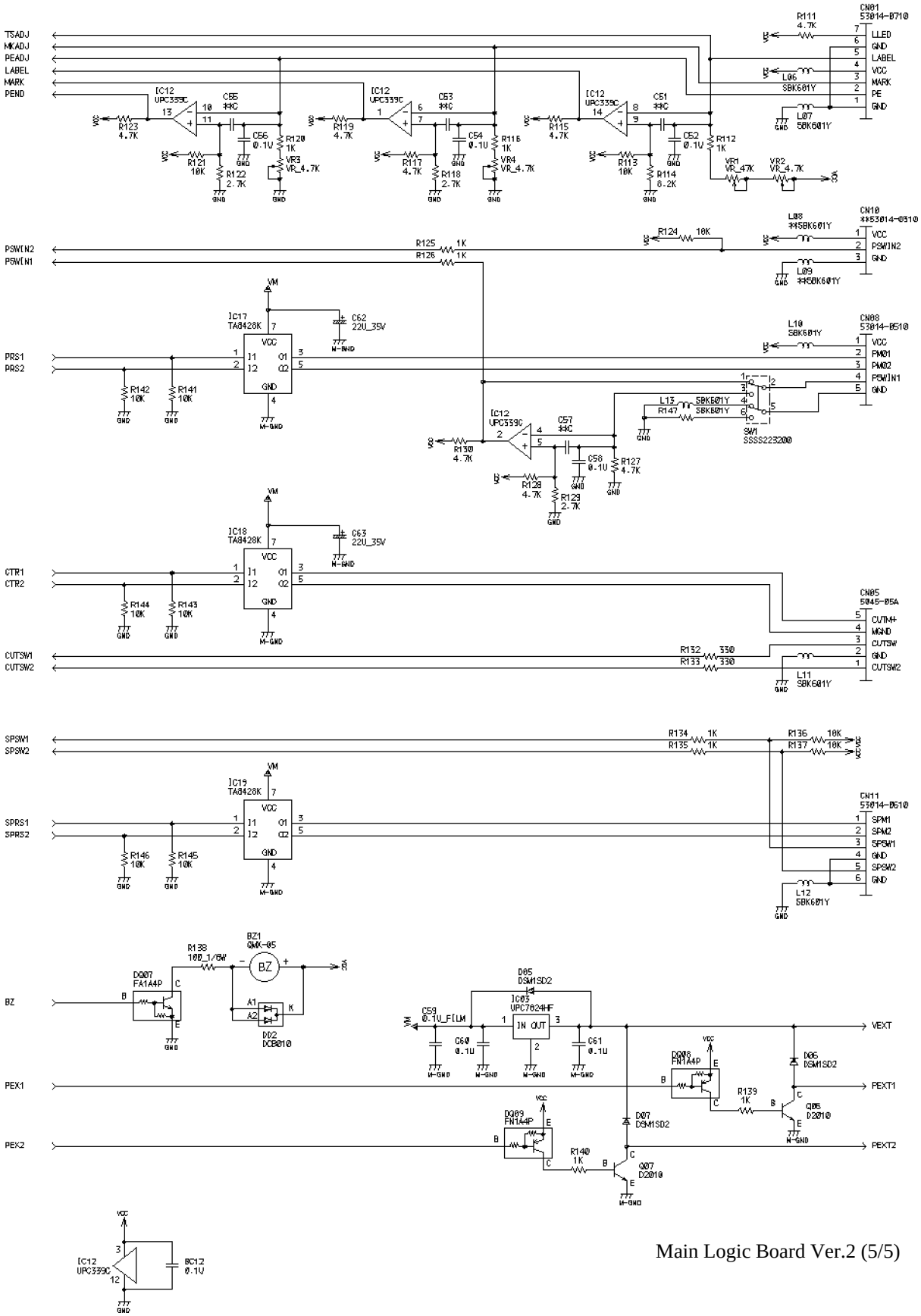
Main Logic Board Ver.2 (2/5)



Main Logic Board Ver.2 (3/5)

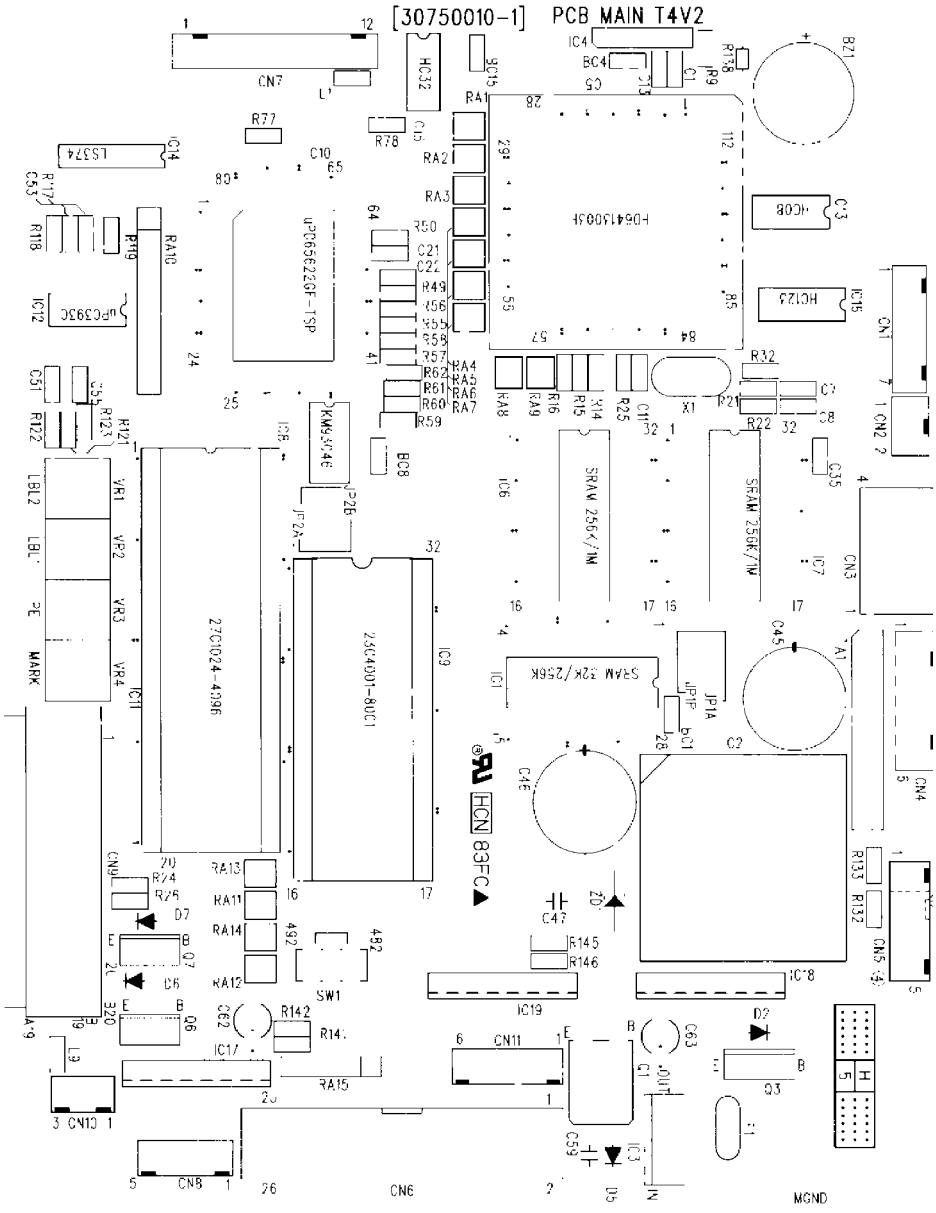


Main Logic Board Ver.2 (4/5)



Main Logic Board Ver.2 (5/5)

6-2. Component Layout



6-3. Parts List

Main Logic Board (Ver.2)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
BC0-16		05751045	CERA. CAPA. CHIP 0.1UF 50V	17		
C1		05122241	CERA. CAPA. CHIP 0.22UF 16V	1		
C2		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C3-10					NOT MOUNTED	
C11		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C12-13					NOT MOUNTED	
C14-15		05122241	CERA. CAPA. CHIP 0.22UF 16V	2		
C21-22					NOT MOUNTED	
C23		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C24-27					NOT MOUNTED	
C31-37					NOT MOUNTED	
C41-44					NOT MOUNTED	
C45-46		05041081	CHEM. CAPA. 1000UF 35V	2		
C47					NOT MOUNTED	
C52		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C53					NOT MOUNTED	
C54		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C55					NOT MOUNTED	
C56		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C57					NOT MOUNTED	
C58		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C59		05251044	FILM CAPA. 0.1UF 50V	1		
C60-61		05751045	CERA. CAPA. CHIP 0.1UF 50V	2		
C62-63		05042264	CHEM. CAPA. 22UF 35V	2		
R1-6		06751031	CHIP RESISTOR 10 K-OHM 1/10W	6		
R7		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R8		06753324	CHIP RESISTOR 3.3 K-OHM 1/10W	1		
R9		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R12-14		06751031	CHIP RESISTOR 10 K-OHM 1/10W	3		
R15					NOT MOUNTED	
R16		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R17-23		06753314	CHIP RESISTOR 330 OHM 1/10W	7		
R24		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R25		06753314	CHIP RESISTOR 330 OHM 1/10W	1		
R26		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R28-30					NOT MOUNTED	
R31		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R32		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R33		06753314	CHIP RESISTOR 330 OHM 1/10W	1		
R34		06752031	CHIP RESISTOR 20 K-OHM 1/10W	1		
R35		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R41-50		06751021	CHIP RESISTOR 1 K-OHM 1/10W	10		
R51-54		06751031	CHIP RESISTOR 10 K-OHM 1/10W	4		
R55-72		06751014	CHIP RESISTOR 100 OHM 1/10W	18		
R73-78		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	6		
R81		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R91-98		06751014	CHIP RESISTOR 100 OHM 1/10W	8		
R99		06752031	CHIP RESISTOR 20 K-OHM 1/10W	1		
R100		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R101-102		06751031	CHIP RESISTOR 10 K-OHM 1/10W	2		
R103-106		06753324	CHIP RESISTOR 3.3 K-OHM 1/10W	4		
R107		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R111		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R112		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R113		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R114		06758224	CHIP RESISTOR 8.2 K-OHM 1/10W	1		

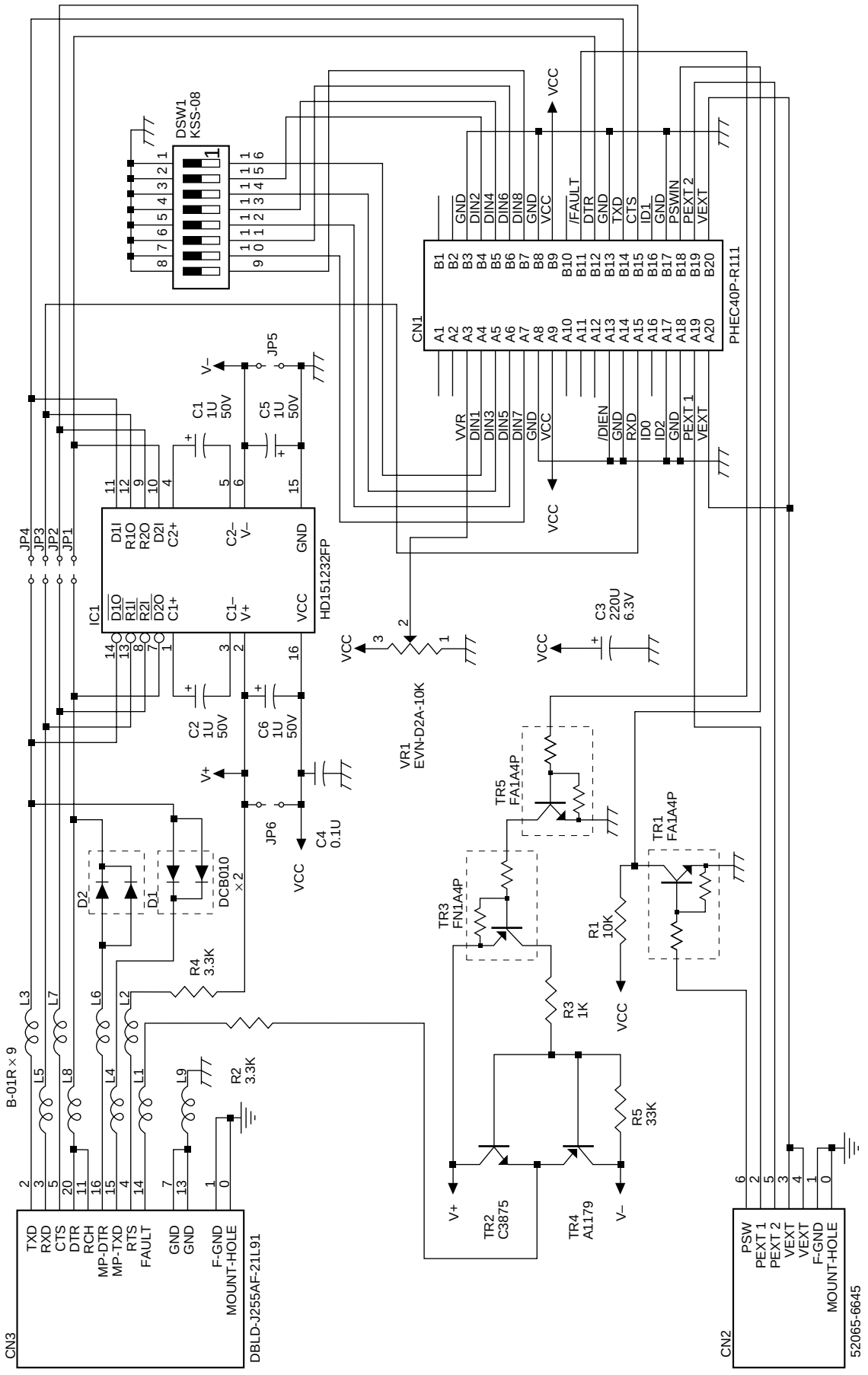
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R115		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R116		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R117		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R118		06752725	CHIP RESISTOR 2.7 K-OHM 1/10W	1		
R119		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R120		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R121		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R122		06752725	CHIP RESISTOR 2.7 K-OHM 1/10W	1		
R123		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R124		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R125-126		06751021	CHIP RESISTOR 1 K-OHM 1/10W	2		
R127-128		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	2		
R129		06752725	CHIP RESISTOR 2.7 K-OHM 1/10W	1		
R130		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R132-133		06753314	CHIP RESISTOR 330 OHM 1/10W	2		
R134-135		06751021	CHIP RESISTOR 1 K-OHM 1/10W	2		
R136-137		06751031	CHIP RESISTOR 10 K-OHM 1/10W	2		
R138		06051014	RD RESISTOR 100 OHM 1/6W	1		
R139-140		06751021	CHIP RESISTOR 1 K-OHM 1/10W	2		
R141-146		06751031	CHIP RESISTOR 10 K-OHM 1/10W	6		
R147		09990738	BEADS INDUCTOR SBK2125-601Y	1		
VR1		06454732	RP RESISTOR RH0615C-47K	1		
VR2-4		06454721	RP RESISTOR RH0615CS-4.7K	3		
RA1-4		06541011	RESIS. ARRAY CHIP V8V101J	4		
RA5-9		06543311	RESIS. ARRAY CHIP V8V331J	5		
RA10		06584729	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
RA11-14		06541011	RESIS. ARRAY CHIP V8V101J	4		
RA15		06584720	RESIS. ARRAY 4.7K-OHM 1/8W 4EL	1		
Q1		07016492	CHIP TRANSISTOR 2SA1649Z*	1		
Q2		07013381	CHIP TRANSISTOR 2SA1338-67*TA	1		
Q3		07113591	TRANSISTOR 2SB1359	1		
Q6-7		07320101	TRANSISTOR 2SD2010	2		
DQ1		07603017	DIGITAL TRANSISTOR FN1A4P	1		
DQ2-4		07603016	DIGITAL TRANSISTOR FA1A4P	3		
DQ7		07603016	DIGITAL TRANSISTOR FA1A4P	1		
DQ8-9		07603017	DIGITAL TRANSISTOR FN1A4P	2		
TA1		07650054	TRANSISTOR ARRAY MP4020	1		
D2		08000091	DIODE DSM1SD2*A	1		
D5-7		08000091	DIODE DSM1SD2*A	3		
DD1-2		08000047	DIODE CHIP DCB010	2		
ZD1		08020090	ZENER DIODE RD7.5EB1T	1		
IC1		08221043	SRAM 6264FP-100NS*EL	1		
IC2		08202033	IC-REG SI-8501L	1		
IC3		08202011	IC-REG UPC7824	1		
IC4		08200109	IC-RESET M51953BL	1		
IC5		08251011	CPU HD6413003TF16	1		
IC6-7		08221056	SRAM 628128BLFP-7*EL	2		
IC8		08222047	EEPROM KM93C46	1		
IC9		08222108	EPROM MX27C4000DC-90	1		
		09110077	IC SOCKET ICS-32-2T	1		
IC10		08240076	GATE ARRAY D65622GF-TSP	1		
IC11		09110020	IC SOCKET DICF-40C-JAE	1		
IC12		08201029	IC-LIN HA17339F*EL	1		
IC13		08231047	CMOS 74HC08AF*TP1	1		
IC14		08211036	TTL IC 74LS374FP*TL	1		
IC15		08231043	CMOS 74HC32FP*EL	1		

Main Logic Board (Ver.2)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC16		08231054	CMOS 74HC123AFP*EL	1		
IC17-19		08200176	IC-MOTOR TA8428K	3		
SW1		09000046	SLIDE SWITCH SSSS223200	1		
CN1		09100370	CONNECTOR 53014-0710	1		
CN2		09100270	CONNECTOR 5483-02A	1		
CN3		09100614	CONNECTOR 5273-04A	1		
CN4		09100267	CONNECTOR 5483-06A	1		
CN5		09100038	CONNECTOR 5045-05A	1		
CN6		09100177	CONNECTOR 5332-26SG1	1		
CN7		09100444	CONNECTOR 53014-1210	1		
CN8		09100516	CONNECTOR 53014-0510	1		
CN9		09100610	CONNECTOR PHEC40R-R111	1		
CN10					NOT MOUNTED	
CN11		09100341	CONNECTOR 53014-0610	1		
X1		09250064	CERA. OSCILLATOR EFO-EC1605T4	1		
F1		09990162	JUMPER WIRE 1/6W-L3.2	1		
L1-4		09990738	BEADS INDUCTOR SBK2125-601Y	4		
L6-7		09990738	BEADS INDUCTOR SBK2125-601Y	2		
L8-9					NOT MOUNTED	
L10-13		09990738	BEADS INDUCTOR SBK2125-601Y	4		
BZ		45390101	BUZZER QMX-05	1		

7. RS-232C Interface Board (Ver. 1)

7-1. Circuit Diagram



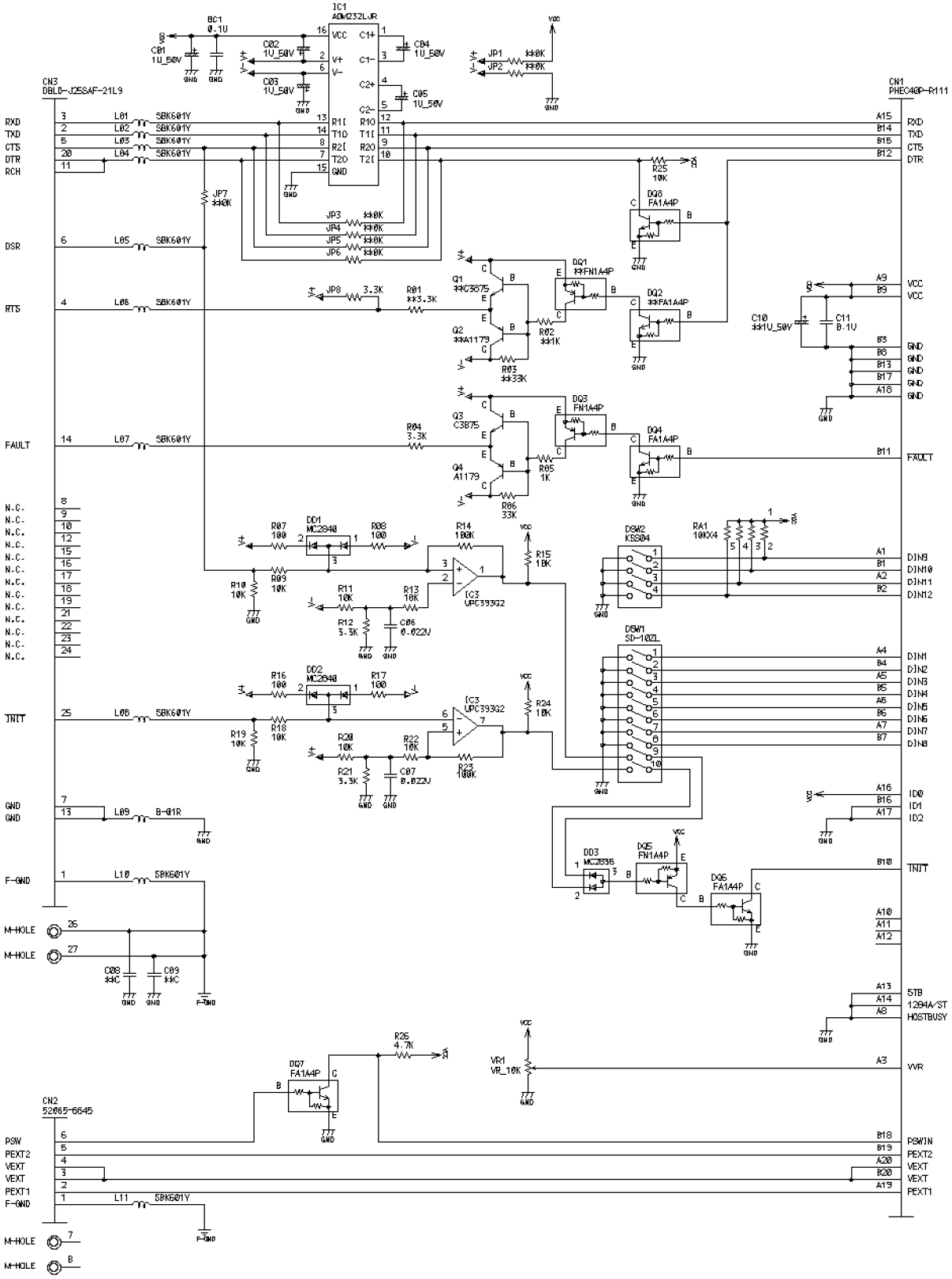
7-2. Parts List

RS-232C Interface Board (Ver. 1)

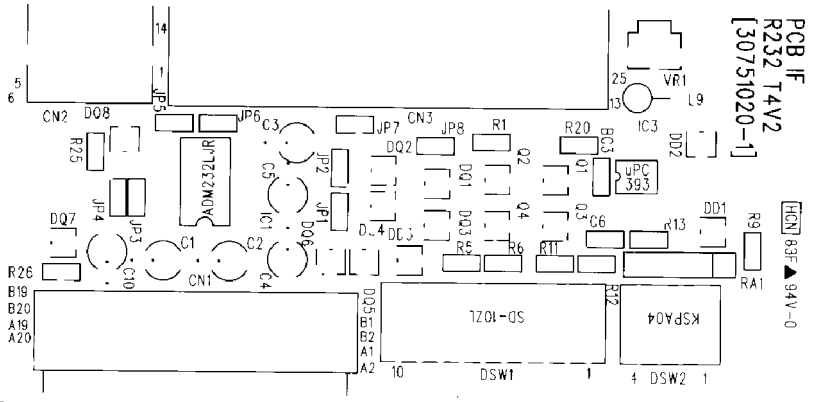
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
C1-2		05051057	CHEM. CAPA. 1UF 50V	2		
C3		05002213	CHEM. CAPA. 220UF 6.3V	1		
C4		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C5-6		05051057	CHEM. CAPA. 1UF 50V	2		
R1		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R2		06753324	CHIP RESISTOR 3.3 K-OHM 1/10W	1		
R3		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R4		06753324	CHIP RESISTOR 3.3 K-OHM 1/10W	1		
R5		06753334	CHIP RESISTOR 33 K-OHM 1/10W	1		
VR1		06451033	RP RESISTOR EVN-D2A-10K	1		
TR1		07603016	DIGITAL TRANSISTOR FA1A4P	1		
TR2		07238754	CHIP TRANSISTOR 2SC3875S-G*AL	1		
TR3		07603017	DIGITAL TRANSISTOR FN1A4P	1		
TR4		07011793	CHIP TRANSISTOR 2SA1179M6-STR	1		
TR5		07603016	DIGITAL TRANSISTOR FA1A4P	1		
D1-2		08000047	DIODE CHIP DCB010	2		
IC1	*1	08200155	IC-I/F HD151232FP*TL	1		
	#1	08200157	IC-I/F ADM232LJR*SOL16	1		
DSW1		09090034	DIP SWITCH KSS08-1	1		
CN1		09100611	CONNECTOR PHEC40P-R111	1		
CN2		09100421	CONNECTOR 52065-6645	1		
CN3		09100483	CONNECTOR DBLD-J25SAF-21L9-1	1		
L1-9		09990705	BEADS INDUCTOR B01-RT	9		

8. RS-232C Interface Board (Ver. 2)

8-1. Circuit Diagram



8-2. Component Layout



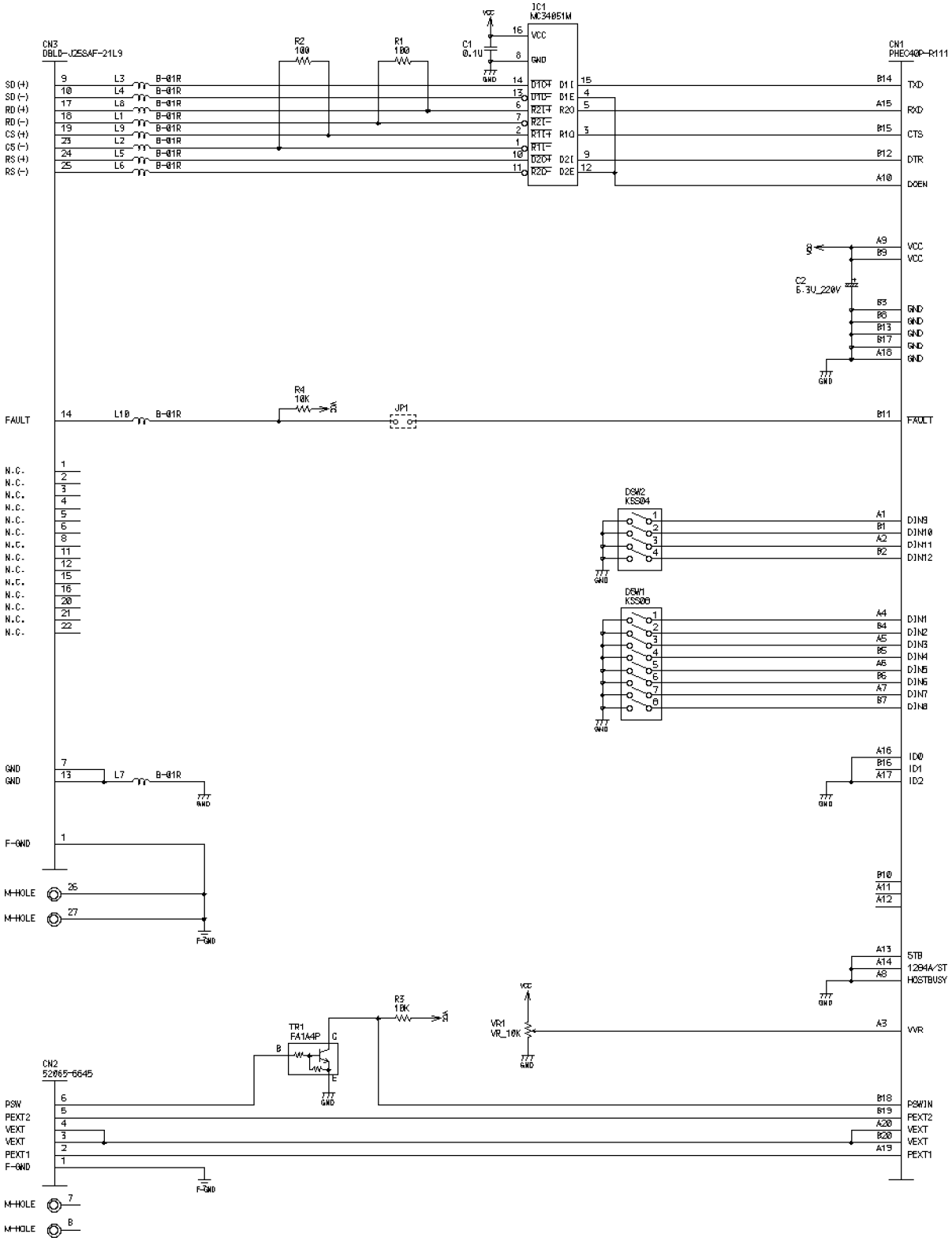
8-3. Component Layout

RS-232C Interface Board (Ver.2)

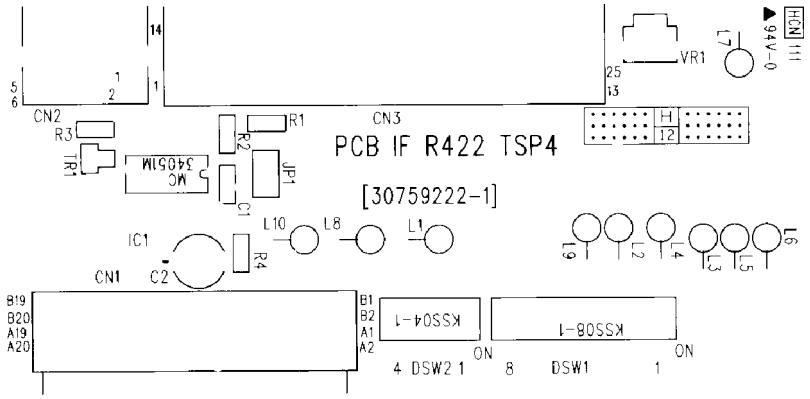
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
BC1		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
BC3		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C1-5		05051057	CHEM. CAPA. 1UF 50V	5		
C6-7		05752236	CERA. CAPA. CHIP 0.022UF 50V	2		
C8-10					NOT MOUNTED	
C11		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
R1-3					NOT MOUNTED	
R4		06753324	CHIP RESISTOR 3.3 K-OHM 1/10W	1		
R5		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R6		06753334	CHIP RESISTOR 33 K-OHM 1/10W	1		
R7-8		06751014	CHIP RESISTOR 100 OHM 1/10W	2		
R9-11		06751031	CHIP RESISTOR 10 K-OHM 1/10W	3		
R12		06753324	CHIP RESISTOR 3.3 K-OHM 1/10W	1		
R13		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R14		06751041	CHIP RESISTOR 100 K-OHM 1/10W	1		
R15		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R16-17		06751014	CHIP RESISTOR 100 OHM 1/10W	2		
R18-20		06751031	CHIP RESISTOR 10 K-OHM 1/10W	3		
R21		06753324	CHIP RESISTOR 3.3 K-OHM 1/10W	1		
R22		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R23		06751041	CHIP RESISTOR 100 K-OHM 1/10W	1		
R24-25		06751031	CHIP RESISTOR 10 K-OHM 1/10W	2		
R26		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
VR1		06451033	RP RESISTOR EVN-D2A-10K	1		
RA1		06581039	RESIS. ARRAY 10 K-OHM 1/8W 4EL	1		
Q1-2					NOT MOUNTED	
Q3		07238754	CHIP TRANSISTOR 2SC3875S-G*AL	1		
Q4		07011793	CHIP TRANSISTOR 2SA1179M6-STR	1		
DQ1-2					NOT MOUNTED	
DQ3		07603017	DIGITAL TRANSISTOR FN1A4P	1		
DQ4		07603016	DIGITAL TRANSISTOR FA1A4P	1		
DQ5		07603017	DIGITAL TRANSISTOR FN1A4P	1		
DQ6-8		07603016	DIGITAL TRANSISTOR FA1A4P	3		
DD1-2		08000059	DIODE CHIP MC2840	2		
DD3		08000068	DIODE CHIP MC2836	1		
IC1		08200157	IC-I/F ADM232LJR*SOL16	1		
IC3		08201013	IC-LIN UPC393G2*T1	1		
DSW1		09090054	DIP SWITCH SD-10ZL	1		
DSW2		09090033	DIP SWITCH KSS04-1	1		
CN1		09100611	CONNECTOR PHEC40P-R111	1		
CN2		09100421	CONNECTOR 52065-6645	1		
CN3		09100483	CONNECTOR DBLD-J25SAF-21L9-1	1		
L1-8		09990738	BEADS INDUCTOR SBK2125-601Y	8		
L9		09990705	BEADS INDUCTOR B01-RT	1		
L10-11		09990738	BEADS INDUCTOR SBK2125-601Y	2		

9. RS-422A Interface Board

9-1. Circuit Diagram



9-2. Component Layout



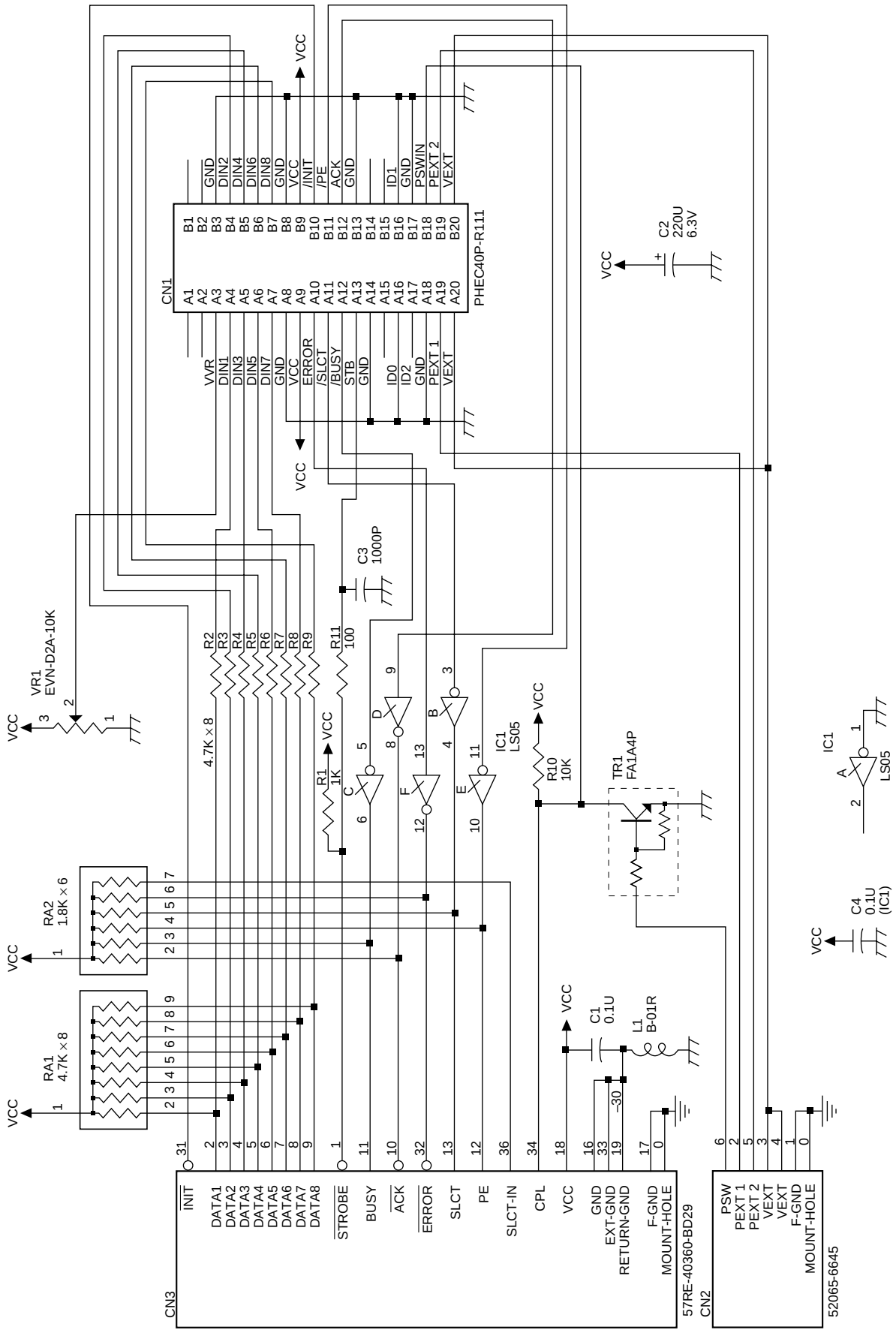
9-3. Parts List

RS-422A International Board (Ver. 1)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
C1		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C2		05002213	CHEM. CAPA. 220UF 6.3V	1		
R1-2		06751014	CHIP RESISTOR 100 OHM 1/10W	2		
R3-4		06751031	CHIP RESISTOR 10 K-OHM 1/10W	2		
VR1		06451033	RP RESISTOR EVN-D2A-10K	1		
TR1		07603016	DIGITAL TRANSISTOR FA1A4P	1		
IC1		08200127	IC-I/F MC34051M	1		
DSW1		09090034	DIP SWITCH KSS08-1	1		
DSW2		09090033	DIP SWITCH KSS04-1	1		
CN1		09100611	CONNECTOR PHEC40P-R111	1		
CN2		09100421	CONNECTOR 52065-6645	1		
CN3		09100483	CONNECTOR DBLD-J25SAF-21L9-1	1		
L1-10		09990705	BEADS INDUCTOR B01-RT	10		

10. Parallel Interface Board (Ver. 1)

10-1. Circuit Diagram



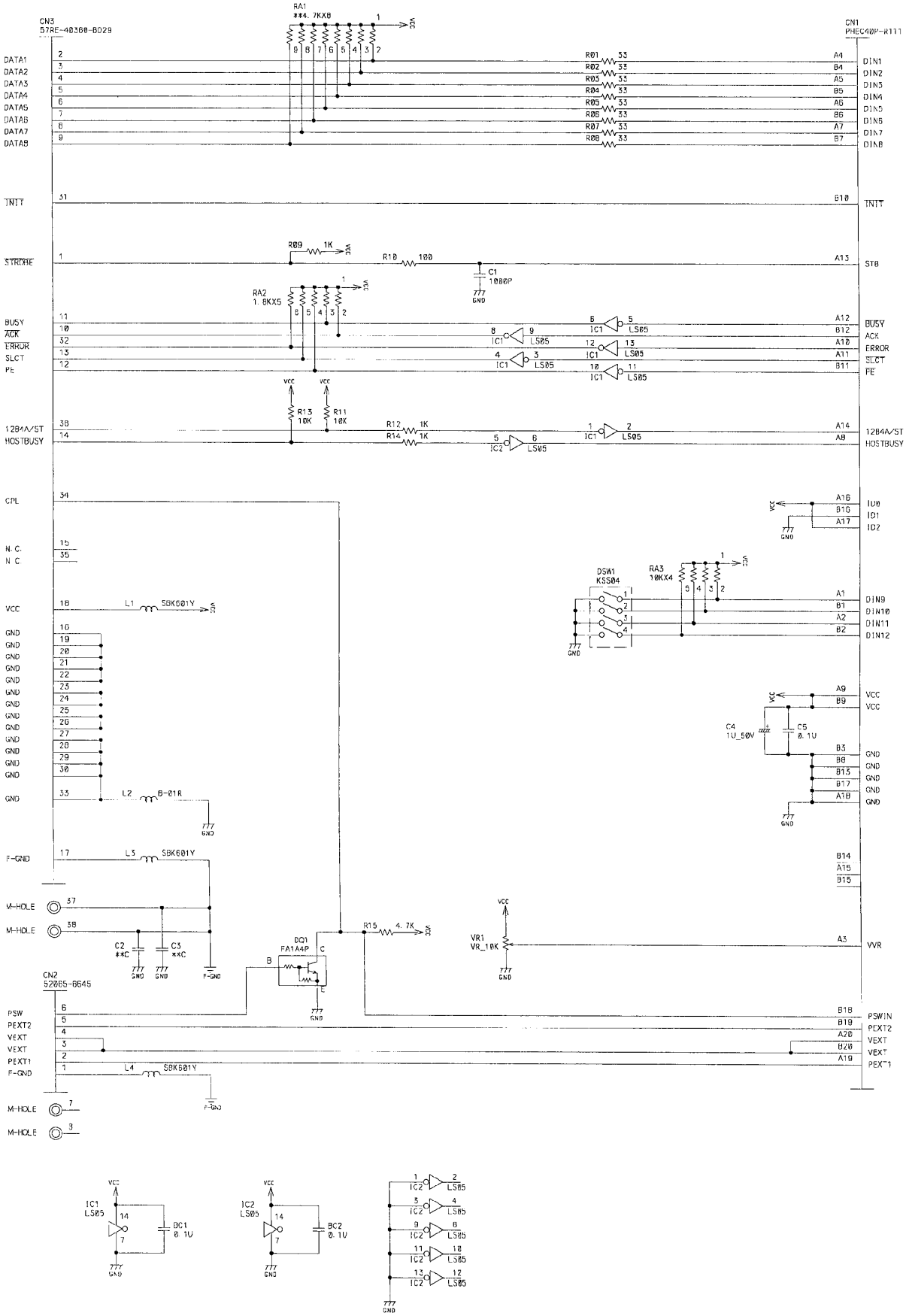
10-2. Parts List

Parallel Interface Board (Ver. 1)

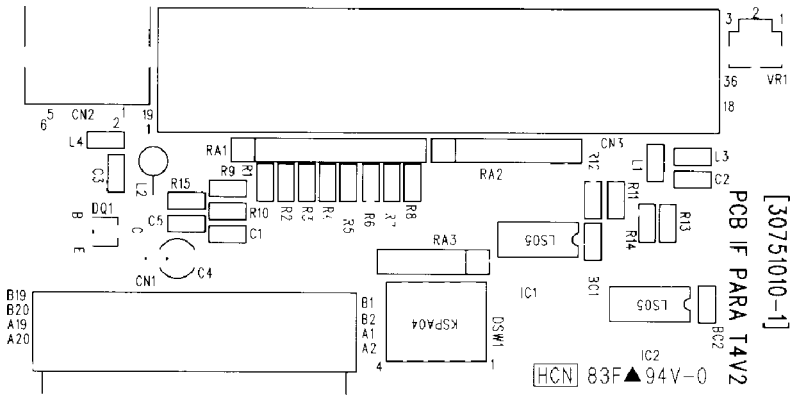
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
C1		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
C2		05002213	CHEM. CAPA. 220UF 6.3V	1		
C3		05751025	CERA. CAPA. CHIP 1000PF 50V	1		
C4		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
R1		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R2-9		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	8		
R10		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R11		06751014	CHIP RESISTOR 100 OHM 1/10W	1		
RA1		06584729	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
RA2		06581824	RESIS. ARRAY 1.8K-OHM 1/8W 6EL	1		
VR1		06451033	RP RESISTOR EVN-D2A-10K	1		
TR1		07603016	DIGITAL TRANSISTOR FA1A4P	1		
IC1		08210142	TTL IC 74LS05FP*TL	1		
CN1		09100611	CONNECTOR PHEC40P-R111	1		
CN2		09100421	CONNECTOR 52065-6645	1		
CN3		09100482	CONNECTOR 57RE40360-730BD29	1		
L1		09990705	BEADS INDUCTOR B01-RT	1		

11. Parallel Interface Board (Ver. 2)

11-1. Circuit Diagram



11-2. Component Layout



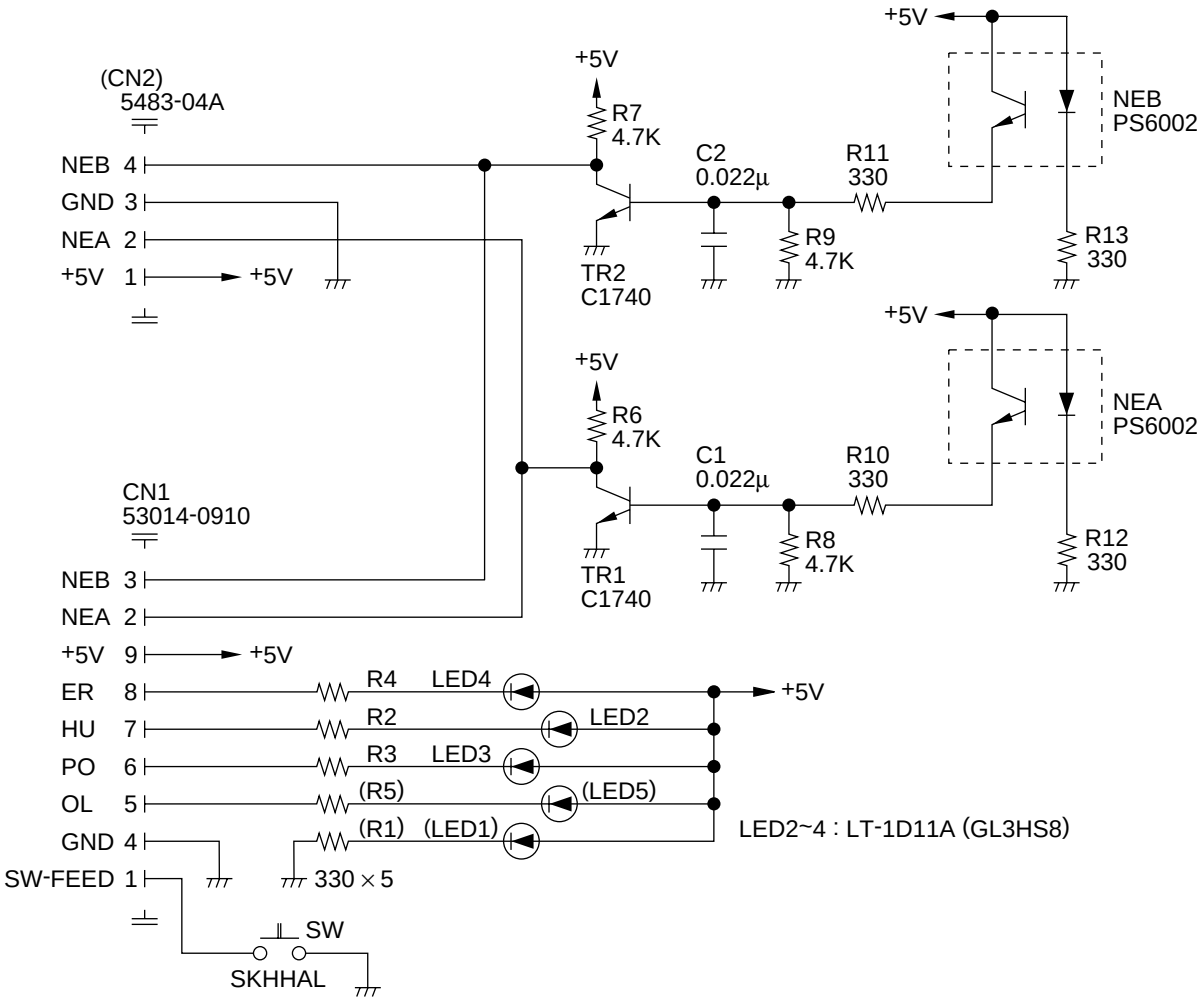
11-3. Parts List

Parallel Interface Board (Ver.2)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
BC1-2		05751045	CERA. CAPA. CHIP 0.1UF 50V	2		
C1		05751025	CERA. CAPA. CHIP 1000PF 50V	1		
C2-3					NOT MOUNTED	
C4		05051057	CHEM. CAPA. 1UF 50V	1		
C5		05751045	CERA. CAPA. CHIP 0.1UF 50V	1		
R1-8		06753304	CHIP RESISTOR 33 OHM 1/10W	8		
R9		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R10		06751014	CHIP RESISTOR 100 OHM 1/10W	1		
R11		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R12		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R13		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R14		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R15		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
VR1		06451033	RP RESISTOR EVN-D2A-10K	1		
RA1					NOT MOUNTED	
RA2		06581826	RESIS. ARRAY 1.8K-OHM 1/8W 5EL	1		
RA3		06581039	RESIS. ARRAY 10 K-OHM 1/8W 4EL	1		
DQ1		07603016	DIGITAL TRANSISTOR FA1A4P	1		
IC1-2		08210126	TTL IC 74LS05FP*EL	2		
DSW1		09090033	DIP SWITCH KSS04-1	1		
CN1		09100611	CONNECTOR PHEC40P-R111	1		
CN2		09100421	CONNECTOR 52065-6645	1		
CN3		09100482	CONNECTOR 57RE40360-730BD29	1		
L1		09990738	BEADS INDUCTOR SBK2125-601Y	1		
L2		09990705	BEADS INDUCTOR B01-RT	1		
L3-4		09990738	BEADS INDUCTOR SBK2125-601Y	2		

12. Near-End Sensor Board

12-1. Circuit Diagram

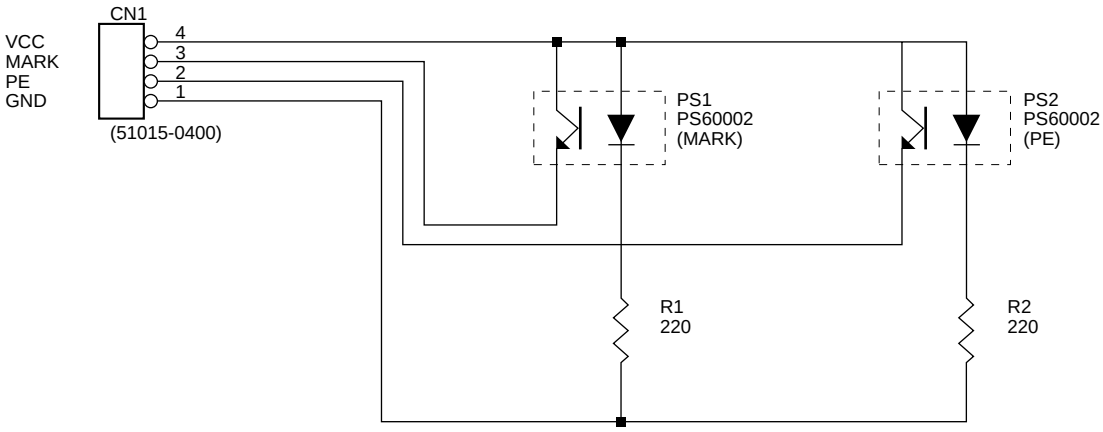


12-2. Parts List

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
C1-2		05152234	CERA. CAPA. 0.022UF 50V	2		
R1					NOT MOUNTED	
R2-4		06053314	RD RESISTOR 330 OHM 1/6W	3		
R5					MOT MOUNTED	
R6-9		06054725	RD RESISTOR 4.7 K-OHM 1/6W	4		
R10-13		06053314	RD RESISTOR 330 OHM 1/6W	4		
TR1-2		07227853	TRANSISTOR 2SC1740SE	2		
LED1					NOT MOUNTED	
LED2-4		08300081	LED LT-1D11A	3		
LED5					NOT MOUNTED	
NEA-B		08300082	PHOTO-INTERRUPTER PS6002A-KS	2		
SW		09010041	PUSH SWITCH SKHHAL	1		
CN1		09100410	CONNECTOR 53014-0910	1		

13. Paper-End Sensor Board

13-1. Circuit Diagram

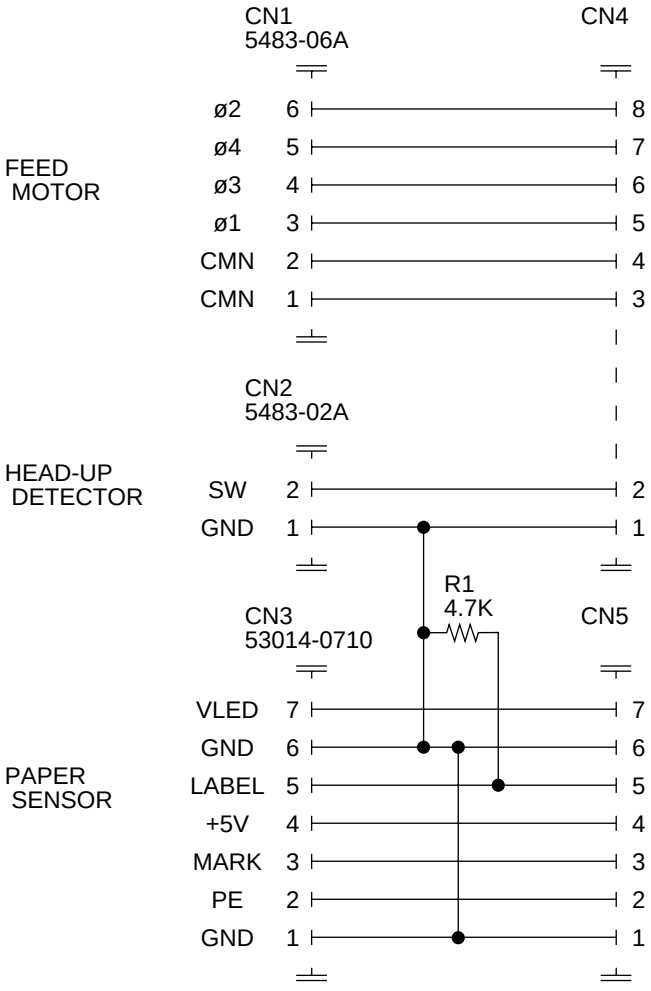


13-2. Parts List

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R1-2		06052211	RD RESISTOR 220 OHM 1/6W	2		
PS1-2		08300082	PHOTO-INTERRUPTER PS6002A-KS	2		
-		30721010	CABLE UNIT TMP4	1		

14. Transit Board

14-1. Circuit Diagram

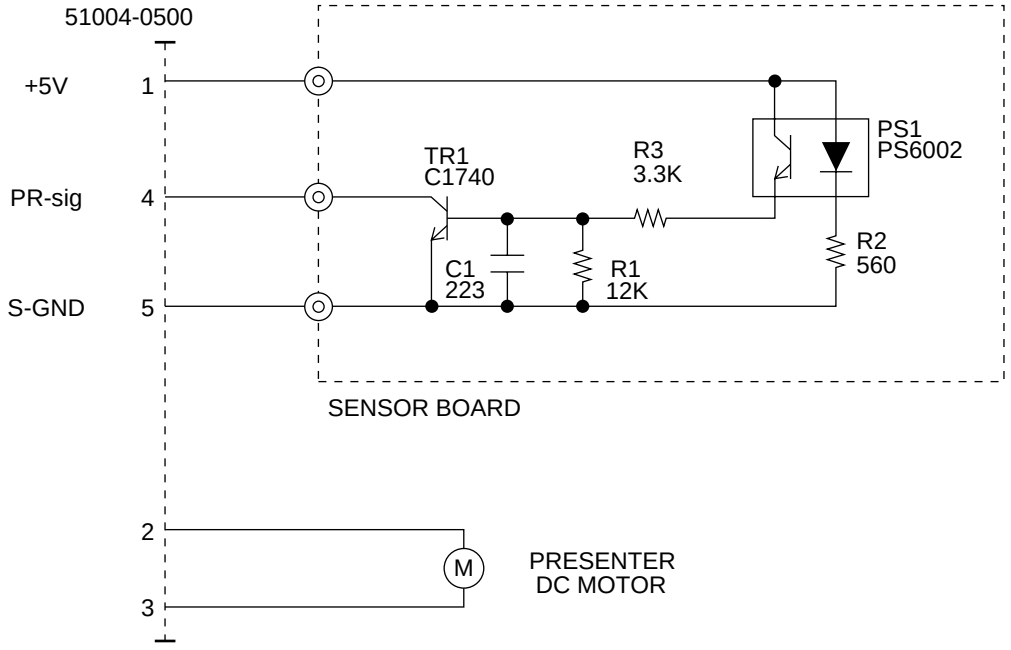


14-2. Parts List

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R1		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
CN1		09100267	CONNECTOR 5483-06A	1		
CN2		09100270	CONNECTOR 5483-02A	1		
CN3		09100370	CONNECTOR 53014-0710	1		

15. Presenter Sensor Board

15-1. Circuit Diagram



15-2. Parts List

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
C1		05532234	CAPACITOR 0.022UF 25V	1		
R1		06051235	RD RESISTOR 12 K-OHM 1/6W	1		
R2		06055614	RD RESISTOR 560 OHM 1/6W	1		
R3		06053324	RD RESISTOR 3.3 K-OHM 1/6W	1		
TR1		07227853	TRANSISTOR 2SC1740SE	1		
PS1		08300082	PHOTO-INTERRUPTER PS6002A-KS	1		

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